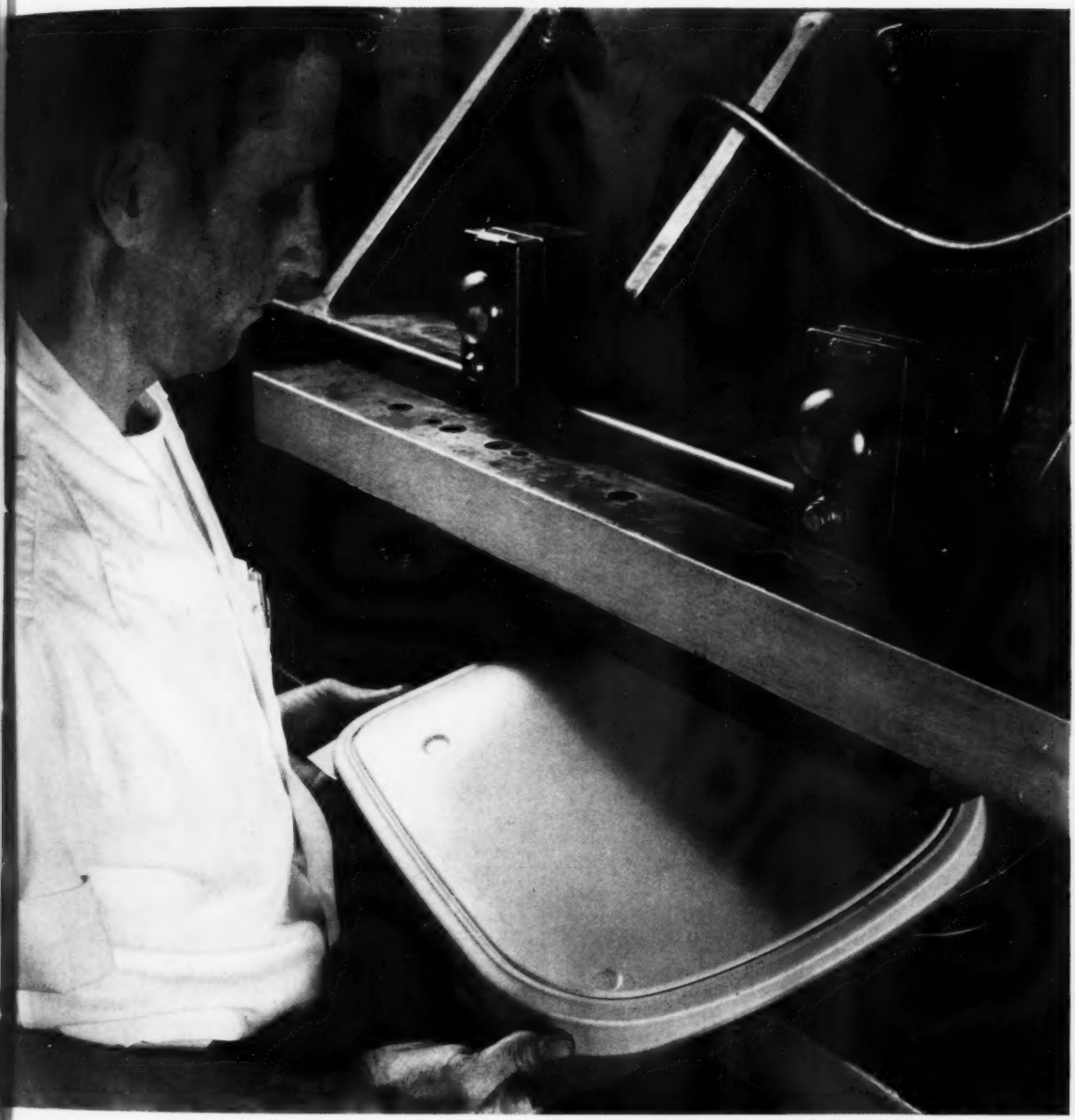
TOOLING & PRODUCTION

OCTOBER 1960

The Magazine of Metal Working Methods



Vinyl Clad Steel No Problem . . . page 61

What's New With The Stampers . . . page 51
Precision Dies—Stampings for Savage Rifles . . . page 58
An Editor Interprets "True Position" . . . page 58

Complete Table of Contents
. . . Inside Cover

NEW
WARNER & SWASEY

NO. 2 MICRO-CUT
UNIVERSAL TURRET LATHE

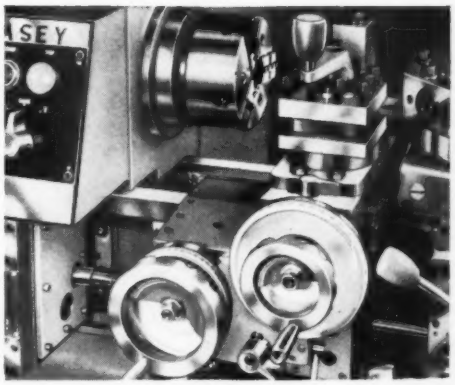
The first 1¼″ capacity turret lathe with full universal, power feed cross slide plus greater accuracy and heavier metal removal capabilities.

The new No. 2 MICRO-CUT Universal is a new kind of turret lathe, especially designed to handle close tolerance work up to 1¼-inch diameter—in all types of materials —in small to medium lot sizes. It is quick to set up, easy to operate, and is available for either bar or chucking work with plain or universal cross slide. The No. 2 MICRO-CUT is ideally suited to handle a wide variety of small diameter turning work in those fields where extreme accuracy, even with heavy metal removal, is essential to profitable operations.

To get the complete story on the new No. 2 MICRO-CUT Universal Turret Lathe call your W/S Field Engineer, or write direct to The Warner & Swasey Company, Cleveland 3, Ohio.

SPECIFICATIONS

SWING — Over bed	14″ Dia.
Over cross slide	6″ Dia.
BAR CAPACITY — Round	1¼″
Square	⅞″
Hexagon	1 1/16″
CHUCK DIAMETER	6″
POWER FEEDS	
Six longitudinal	.0015 to .0173
Six cross	.0014 to .016
SPINDLE SPEEDS	
Three ranges of six	50 to 3000 rpm
MOTOR — Two Speed	5/2½ hp



UNIVERSAL CROSS SLIDE & THREE JAW CHUCK
The No. 2 MICRO-CUT Universal cross slide, with square turret featuring a curvic coupling locating and locking mechanism, has power feed in both cross and longitudinal directions.

Two and three-jaw, hand or air operated chucks are available for holding small castings, forgings and bar stock slugs.

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS . . . WITH A WARNER & SWASEY

CIRCLE INFORM-A-GRAM KEY NO. 2

TOOLING & PRODUCTION Magazine

VOL. XXVI, No. 7

OCTOBER 1960

FEATURES IN THIS ISSUE:

Radioisotopes Broaden The Approach To Machining Studies 6

Talk of the Month by Marko Pabliobagis and E. J. Krabacher

A New Nation of 33,000,000? 49

Editorial by E. Willard Pennington

What's New With the Stampers 51

by Carol Reuss

Reporting an exclusive T&P conference with the Board of Directors of the Pressed Metal Institute.

A Potential Money-Saver: Stacked Stampings 52

Looking for ways to replace forgings, castings, or machined parts with stampings? Here's a real assist.

Precision Dies . . . Precision Stampings . . . For Savage Sports Rifles 55

by E. Willard Pennington

Traditionally, rifle parts are machined from the solid. In these examples, tradition is upset by precision stampings from progressive dies.

An Editor Interprets "True Position" 58

by William E. Hoffman

A graphic portrayal of the "TP" tolerancing method, and the many advantages that accrue to product design, manufacture and gage making.

Erector Set Draw Dies Are Timesavers 60

With adjustable die sets you can have prototype stampings in days instead of weeks.

Vinyl Clad Steel No Problem 61

The Cover Story

How vinyl coated steel can give your stamped product a new dimension of color, warmth and texture.

Turn over for additional Contents . . .

© Huebner Publications, Inc., 1960

Form 3579 requested. Send to Editorial and Business Offices: 1975 Lee Road, Cleveland 18, Ohio. Accepted as a Controlled Circulation Publication at Shepherdsville, Ky. Single copies, $1.00 each. U. S. subscription rate $2.00 per year for metalworking plant operating executives and department heads. All other subscriptions, $6.50 per year. Foreign subscriptions, $10.00 per year.

Here's How Dial Feeds Can Boost Your Press Production 65
by William W. Schug

Dial feeds—carriers for either parts or tooling—are most versatile and are rapidly gaining favor in production and assembly.

Ceramics Can Take It 72
by Horace Frommelt

Real eyeopeners: These case histories from production show that ceramic tools cut costs while they cut metal.

How Chisholm-Ryder Slashed Hole Punching and Notching Costs 80

See how Chisholm-Ryder's tool and methods groups uncovered a previously overlooked area of cost reduction in producing sheet metal parts.

SHORTS:

Hand Grinder Used for Production Job 46
Toolroom Lathe for Accurate Threading 57
Convertible Transfer Line 64
Steel Selection Simplified 68
Press Extrudes 120 Cans A Minute 77
Precision Blanks Made In Single Operation .. 78
Spring Producing Line 126

DEPARTMENTS IN THIS ISSUE:

Personally Speaking 4
New Calling Cards 40
Men You Should Know 84
Catalogs — and other helpful literature 88
Product News 106
Cumulative Editorial Index 134
Advertisers' Index 136

BPA

READERSHIP Circulation RESEARCH

R. L. Huebner, Publisher
E. Willard Pennington, Editor

Carol E. Reuss, Managing Editor
William E. Hoffman, Engineering Editor
Charles Weiner, Assistant Editor
Margel F. Benn, Editorial Assistant

Contributing Editors:
Carl F. Benner
Ernest J. Urbas
Nyles V. Reinfeld
Lawrence J. Curran, News Editor
E. J. Brooks, Art Director

B. C. Jackson, Research Manager
P. E. Hager, Production Manager

Douglas Banister, Circulation Manager
Mary Yoshida, Contract Manager

Published Monthly by HUEBNER PUBLICATIONS, INC.
1975 Lee Road, Cleveland 18, Ohio
FAirmount 1-4040

R. R. HUEBNER.....Chairman, Secretary, Treasurer
RAY L. HUEBNER .....President
GEORGE J. HUEBNER, JR. ....Vice President

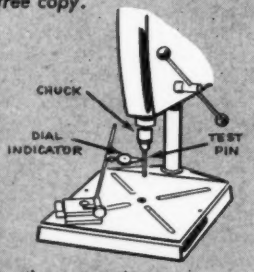
A
SHOP SUGGESTION
FROM
SUPREME

HOW TO TEST A CHUCK
FOR ACCURACY...

INDUSTRIAL DISTRIBUTORS · THE RIGHT HAND OF PRODUCTION

For fastest, most dependable service . . . order from your LOCAL Distributor

Supreme publishes an Engineering Catalog that gives exact information on testing a chuck for accuracy. This catalog defines and guarantees each Supreme Chuck's runout limits. *Write for your free copy.*



In the meantime, you can make an accuracy test by this method: Fit a hardened test pin into the chuck. Clamp a dial indicator to the machine so that its point touches the test pin an inch or more below the chuck. If runout is indicated, remove the chuck and repeat test on the arbor or spindle to determine the offending part.

Dirt or chips in the chuck arbor hole can cause runout; so can bent spindles or loose bearings. *Look for the real cause.*

DIV. OF A·S·R PRODUCTS CORP.

Tool room accuracy for production line use

Supreme BRAND Chucks

SUPREME PRODUCTS CORPORATION
2222 SOUTH CALUMET AVENUE · CHICAGO 16, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 3

DECISIONS DECISIONS DECISIONS

Be assured of warranteed lowest Diamond Wheel costs by United States Diamond Wheel Co.'s on-the-job "PROGRESSIVE SPECIFICATIONS."

This system eliminates "fishing" and **warrantees** top cutting efficiency. We'll show you the ultimate production Diamond Wheel grinding.

PRESSURELOK® IS BEST

PRESSURELOK (the preformance bond) makes the best of Diamond wheels because it scientifically combines warranteed amounts of graded Diamonds distributed in constant density throughout a perfect bond which wears uniformly at the ideal rate of Diamond usage.

be SURE . . . get

PRESSURELOK®

Write for our catalog No. 957 or call us at Aurora TWinoaks 7-9181 for "Progressive Specifications" on your job without any obligation on your part.

US UNITED STATES DIAMOND WHEEL CO.

835 ILLINOIS AVENUE AURORA, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 4

OCTOBER 1960
VOL. XXVI, No. 7
GEORGE J. HUEBNER, Founder
1885 - 1956

personally speaking...

Dear T & P Reader:

Have you seen Echo I lately? I try to catch a look at it every night that it is visible and each time I see it scooting across the sky it amazes me as much as it did the first time I saw it. My hat's off to all who had anything to do with it.

Do you know what Echo I is made of? Sure, it's a balloon, but do you know how thin skinned it is? If not, I'm sure you'll be amazed to learn that its skin is a plastic material only a half thousandth thick and to make it reflective it is coated with aluminum seven millionths thick.

No doubt you have read that Echo is orbiting a thousand miles from earth. It had to be inflated after it reached that distance. What a fantastically delicate job, — inflating a balloon one hundred feet in diameter with skin one half thousandth thick, one thousand miles from the earth. We know it was done because seeing is believing.

Up to the time of Echo, I had a hard time being enthusiastic about rockets and missiles. But Echo is something anyone can get excited about. If you haven't seen it, check its schedule on the next clear night and watch it from the time it appears until it is no longer visible. I'm sure you, too, will be thrilled over the ingenuity of your fellow man as you watch Echo appear out of the shadow of the earth and then about twenty minutes later disappear into it. As it begins to leave your sight think who might then be looking at it, — Britons, — Scandinavians, — Russians?

I hope you, too, will get excited about this great achievement. I know it will be a long time before the thrill of watching Echo wears off for me. Of course, it is changing its orbit continually, so if it is no longer visible by the time you read this, please accept my regrets.

You're going to see something else fantastic right here in the good old U. S. A. in the next ten years. See Editor E. W. Pennington's editorial in this issue. He tells how, in this decade, the U. S. will absorb and assimilate a "nation" of 33,000,000 souls. Read it! It will give you a perspective of our coming growth that may spark some ideas for you.

This issue is our 14th annual featuring Press Dies and Stampings. The subjects range from press produced components for sporting guns to press tooling short cuts and time savers. And how about the cover story featuring pressworking decorative vinyl coated steel.

I'm writing this while at the Machine Tool Exposition in Chicago. It's the first day, — and what a day. If you, too, were here, you'll know what I mean.

Cordially yours,

Ray Huebner

Publisher

C-79

V-R CREATING THE METALS THAT SHAPE THE FUTURE

New cutting tool materials... through metallurgical research

Years of research, experimentation and comprehensive testing have been devoted to every type of product being manufactured at V-R. By working closely with all types of industry, this metallurgical knowledge is effectively applied to meet industry's ever-changing demands for new cutting tool materials.
Above is a V-R metallurgist checking specific gravity of a metal sample on an ultrasensitive scale. Research, such as this, provides the basis for developing new cutting tool materials; for example, VR-65, a new titanium cemented carbide grade, for ultra high speed machining on *all* types of steel.

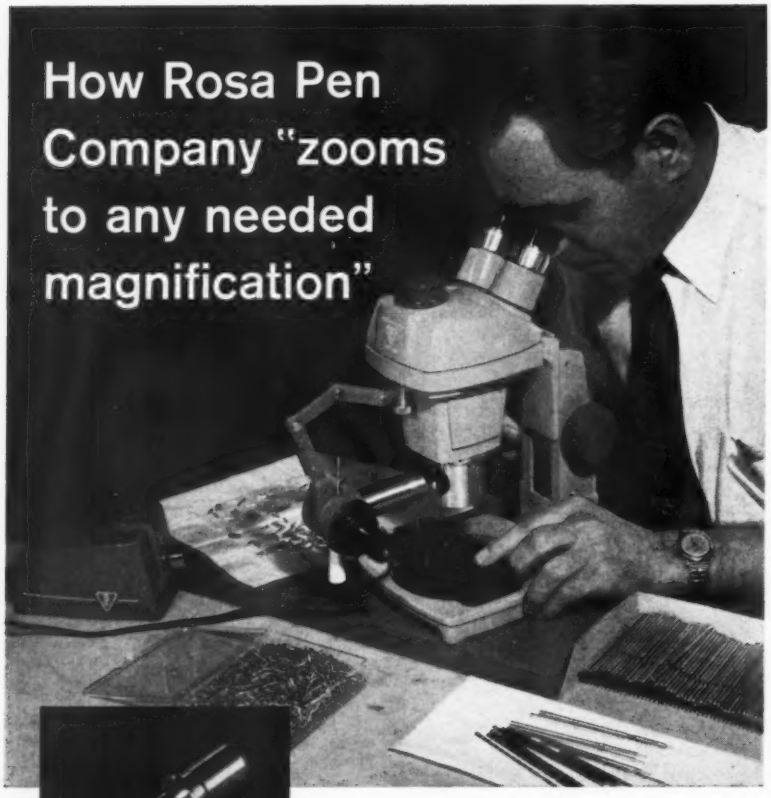
For a complete catalog of V-R quality products write:

V-R VASCOLOY-RAMET
888 MARKET STREET • WAUKEGAN, ILLINOIS

C-790

CIRCLE INFORM-A-GRAM KEY NO. 5

How Rosa Pen Company "zooms to any needed magnification"



Rosa uses B&L StereoZoom Microscopes for internal inspection of socket this size.... , zooms instantly to any power needed for other inspections.

Before spinning the ball (as small as the period at the end of this sentence) into the socket of their fine ball-point pen, Rosa Pen Company, Lyndhurst, N. J., uses B&L StereoZoom® Microscopes for a number of critical checks.

They check the interior finish of the socket (1 mm to .025" diameter, depending on the model), using the B&L Vertical Illuminator for depth lighting. The ink channels inside the socket are checked for uniformity and freedom from flaw. The ball is checked for finish, uniform surface, feather edge. After assembly, ball and socket are inspected for concentricity and free spin, and the ball's feather edge is checked again.

"With this new B&L microscope," says Mr. A. G. Rosa, President, "we can zoom up or down, for the different magnifications we need for different inspections—from 3.5X to 120X—with the work always in the field of view, and the same free working distance all the time."

Find out how B&L StereoZoom Microscopes can help solve some of *your* toughest assembly and inspection problems.

BAUSCH & LOMB INCORPORATED
77310 Bausch St., Rochester, N.Y.

☐ Send me new B&L StereoZoom Catalog D-15

☐ Schedule a demonstration at my convenience.

Name, Title .....

Company .....

Address .....

City ..... Zone ..... State .....

BAUSCH & LOMB
SINCE 1853

CIRCLE INFORM-A-GRAM KEY NO. 6

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Talk of the Month

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Radioisotopes Broaden The Approach To Machining Studies

by Marko Pabliobagis and E. J. Krabacher

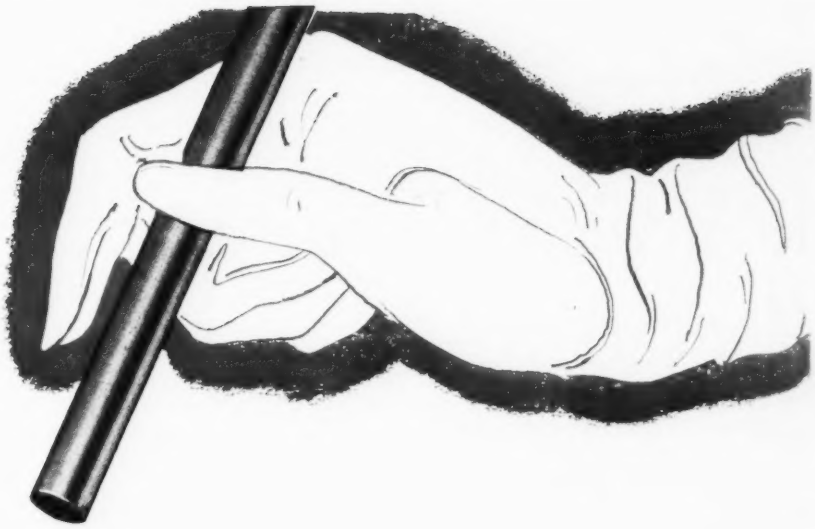
Mr. Pabliobagis is senior research physicist, and Mr. Krabacher is senior research supervisor, at The Cincinnati Milling Machine Co. The talk from which this feature is excerpted was presented at a meeting of the Society of Automotive Engineers.

THE INTRODUCTION of radioisotopes to industry has made available a new research tool that has permitted us to broaden our approach to machining studies. The use of radioisotopes in the form of radioactive cutting tools that have been rendered radioactive by neutron bombardment in an atomic reactor has made it possible to extend our knowledge of the tool wear process. The necessity for a thorough understanding of this process has become increasingly important with recent advances in metalworking requirements.

Since the cutting phenomena is a complicated physical process, accurate measurement of tool wear becomes a difficult problem. Essentially, three conventional methods are available for measuring tool wear: measurement of the linear dimensions of the worn areas of the cutting surfaces of the tool (such as measurement of the wear land on the flank), geometrical determination of the worn areas or volumes, or determination of the weight of the worn volumes.

The most generally used method of tool life end point determination is by optical measurement of the linear dimensions, i.e. measurement of the wear land on the

. . . **Continued on page 8**



BENCO MASTER COLLETS

hold your stock *Gently* yet firmly.

Martin® Master Collet

You can save money and take advantage of the full capacity of your machines by using Benco Master Collets and pads of assorted sizes. Pads are front loading . . . a time saving feature since they can be changed without removing the collet from the spindle.

Built to precise standards, Benco Master Collets are sold on a satisfaction guaranteed basis. Sizes for most machines are carried in stock for immediate delivery.

You can be sure of maximum performance — for the longest period of time — at the lowest cost when you use Benco Master Collets.

Write for new catalog.

"CT" Master Collet

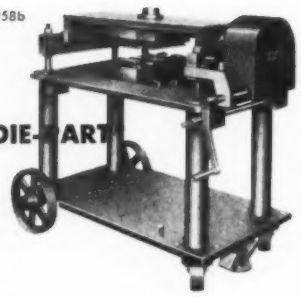
"CB" Master Collet

BENCO COLLET MANUFACTURING CO.

CLEVELAND 14, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 7

2958b



PROGRESSIVE DIE MAKERS

Exclusively Yours!

In use, punch is attached to underside of top plate and aligned with die. Die is then attached to middle plate. With crank in lower position top plate is raised and lowered, separating or fitting punch and die. Leverage is 200# of pressure-or-pull for each pound of energy applied to crank. With crank in upper position top plate can be rotated 360° to bring punch into position for inspection and correction.

Both surfaces of top plate and top surface of middle plate are machined for accuracy and expertly fitted for parallelism. Zero position of top plate, which re-aligns punch and die after inspection, is achieved when positioning pin enters alignment hole.

Load Capacity	2,500 lbs.
Top Plate Travel	18¼"
Top Plate Size	31¼" x 12"
Middle Plate Size	32¾" x 24"

DIE-PART is the newest member of an old and distinguished family of portable elevating tables as shown below.

2958c

PORTELVATOR ® "50-6"

A HANDY HAMILTON PORTABLE ELEVATING TABLE

The Hamilton line of standard portable elevating tables includes manually operated four wheel and six wheel models in various sizes and with lift capacities from 1,000 to 5,000 pounds. Each unit features a high speed arrangement for light loads or rapid return. Rubber tires may be specified if desired. Hand crank may be operated from a side position or from an end position also as specified.

Many additional features are available. These include extended top plates, roller conveyor tops, perimeter rail enclosures, and the like. For complete information please write for our FREE Bulletin No. 2958c.

Complete operating information, including specifications and dimensions, may be found in our FREE DIE-PART BULLETIN NO. 2958. Please ask for it by name and number.

THE HAMILTON TOOL COMPANY

832 SOUTH NINTH STREET, HAMILTON, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 9

. . . Month's Talk from page 6

tool flank. The relationship between flank wear and cutting time is observed until complete failure of the tool occurs or until a predetermined amount of flank wear is reached. While a plot of the flank wear vs. cutting time can in many cases give a linear relationship and a measure of tool wear, the experimental scatter in the data, especially if the cascading type, makes it difficult to accurately predict tool life. Uncertainty of tool wear based on the above tool life end point criteria commonly varies by as much as ±30%.

The determination of tool wear by measuring the volume or weight changes of the cutting tool would be a better method. However, in view of the fact that the loss of volume or weight of the tool during the wear process is an extremely small quantity in most cases, as compared to the total volume or weight of the tool, the uncertainties of measurement due to build-up, i.e. particles of built-up edge, and other foreign material remaining attached to the tool, are often of the same order of magnitude as the quantities being measured themselves.

The principal deficiencies of the methods listed above are the comparatively low precision of measurement with the expenditure of large amounts of labor, time, and material.

With the introduction of the radioactive tool wear method by M. E. Merchant in 1950, and B. Colding and L. G. Erwall in 1951, a method became available for accurately and rapidly evaluating tool wear. Not only has it proven to be an accurate and rapid method, it offers a technique for investigating the actual mechanism of tool wear. Essentially, with this method one determines the amount of tool material worn from a cutting tool during a brief period of cutting.

By machining with a radioactive cutting tool and then measuring the activity of the wear products on the chips, a quantitative measure of tool wear can be obtained. Since the amount of radioactivity present on the chips is directly proportional to the quantity of metal worn from the tool during the cutting operation, this radioactivity indicates directly the rate of tool wear. Therefore, if the radioactivity of chip samples obtained under different machining conditions are compared, then the relative tool wear or tool life for these different conditions can be determined.

The sensitivity of the radioactive method is related to the ability of detecting and accurately measuring extremely minute amounts of radioactivity.

The accuracy of the radioactive method arises from the fact that all test cuts of a particular evaluation are made with the same cutting edge under otherwise identical conditions. Further, the duration of each test cut is quite brief, thus excluding abrupt changes in the cutting process. Finally, a fairly large number of test cuts can be made in a short period of time, and since each test cut constitutes a tool wear determination, an average tool wear value can be obtained.

Radioactive Procedures

There are a number of methods by which the cutting tool can be made radioactive. Of the methods available by far the simplest, and the one almost universally used, is the thermal neutron irradiation process. In this method the tools are prepared ahead of time in the normal manner and then sent to an authorized facility for irradiation. E. I. Goodman has developed the following technique for preparing their radioactive tools. Pure tungsten powder is thermal neutron irradiated, producing W-185 and W-187; the W-187 activity is permitted to die out and then the W-185 is mixed in a carbide formula and sintered into finished cutting tools.

The choice of the radiosotope to be used in the cutting tool depends on a number of factors — the chemical composition of the tool material, the half-life of the available isotopes, the method to be used to detect the activity, and the specific activity of the tool.

Essentially all high speed steel and carbide tool materials contain either chromium, cobalt, tantalum or tungsten, or combinations of

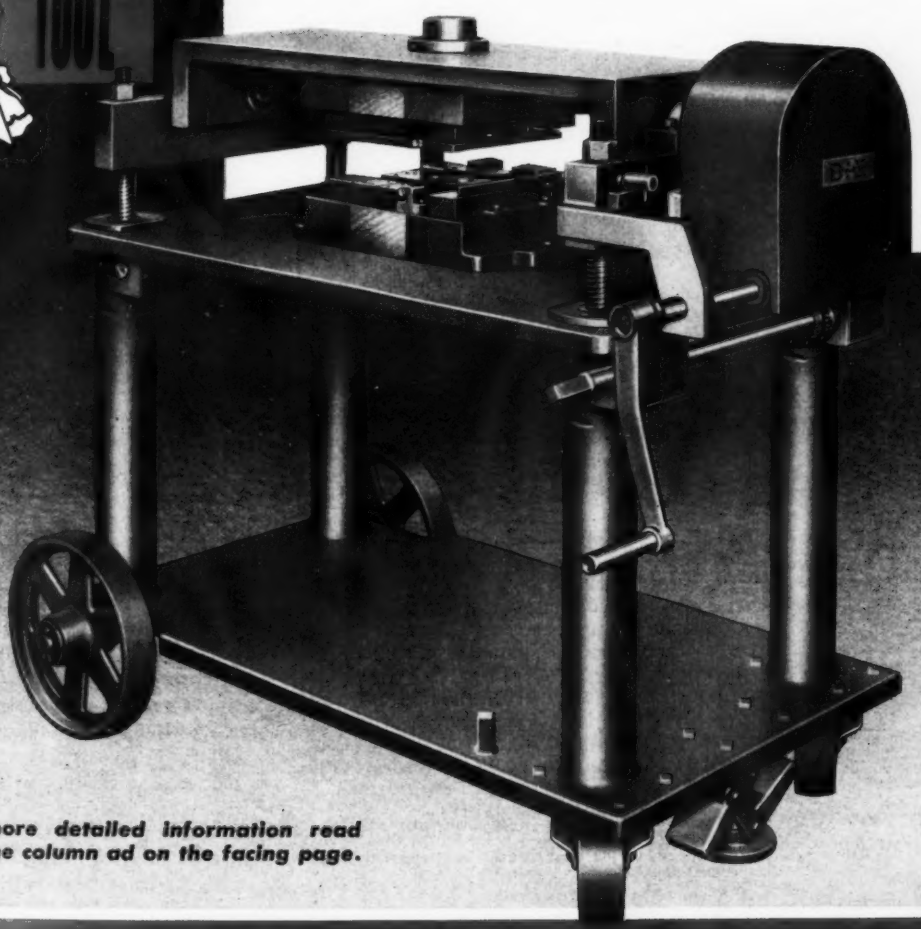
. . . Continued on page 10

PROGRESSIVE DIE MAKERS...

Exclusively Yours!

DIE-PART®

A portable device for maintenance, fitting, and testing of dies. Increases accuracy and reduces costs . . . invariably. Install it and change your competitive situation over night. Be able to underbid competition and yet show a profit.



For more detailed information read the one column ad on the facing page.

THE HAMILTON TOOL COMPANY

832 SOUTH NINTH STREET HAMILTON, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 9

. . . Month's Talk from page 8

these elements, hence the activation of tool materials becomes a simple matter since these elements can readily be made radioactive by thermal neutron irradiation.

The half-life of the radioisotope is an important consideration since it determines the length of time available for carrying out the tests. If one uses the W-185 isotope, which has a half-life of 24 hrs, the total useful time for carrying out the tests is about five days. Additionally, since the activity of the tool is decreasing rapidly, a correction factor for the decay constant must be applied to the counting data. The use of the relatively long half-life radioisotopes . . . overcomes the problems encountered with the use of W-185 but introduces the minor problem of disposing of the cutting tools and chips after the tests have been completed. Users of the radioactive tool wear test method are divided about equally between the use of short and long half-life isotopes.

The method or methods to be used in detecting the radioactivity must be considered since the instrumentational techniques depend on the type of radiation emitted by the various radioisotopes. If beta radiation is used for indicating the radioactivity present on the chips, it is necessary to flatten and arrange them in a standard pattern for measurement with a beta detector, normally either an end-window Geiger-Muller tube or a gas flow counter. The efficiency of detection with the Geiger-Muller tube is about 10% and approximately 50% for the gas flow counter.

If gamma radiation is used for the detection of the radioactivity, it is not necessary to flatten the chip because of the penetrating power of gamma rays. The chips are placed in a container and placed "on" or "in" a well of a scintillation counter. The efficiency of this counter is 24%. It is advantageous to be able to measure both the beta and gamma radiation of the wear products on the chips.

The specific activity, i.e. millicuries or microcuries per gram of tool material, to a large extent is determined by the method or methods to be used in detecting the radioactivity of the wear products on the chips. In the early days of the radioactive tool wear test method, when the only available means for measuring the gamma activity was the Geiger-Muller tube, specific activities of 6 to 60 millicuries per gram of tool material were common. The need for such relatively high activities was necessitated because of the very low efficiency of gamma detection by Geiger-Muller tubes (0.1%). However, with the advent of scintillation counting techniques it has been possible to greatly reduce the specific activity of the tool and still, in fact, obtain much higher chip counting rates. At the present time, tools with a specific activity of 500-600 microcuries (1/10 to 1/100 of the former values) per gram of tool material can be used.

. . . Continued on page 12

THE SAW
JOHNSON
JOHNSON
MODEL 'J'
Johnson Model J
(Wet or Dry)
Cuts anything in your stock pile. 10" rounds, 18" flats, structurals or odd shapes. Centralized controls, special safety features, variable speeds.

that costs you NOTHING!

True, you pay the low initial purchase price, but the big, rugged Johnson Model J is so well engineered, so dependable, so troublefree—so versatile, fast and accurate, that it quickly pays for itself in tangible savings. One Johnson metal cutting band saw . . . or a battery of them, will pay you big dividends in time, labor—smooth production and eliminate scrap.

Write Today . . . for your copy of the new Johnson catalog.
All models and accessories described, illustrated in full.

Johnson MANUFACTURING CORPORATION
1015 Barnes Street Albion, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 10

How tool steel users save 5 ways with precision ground flats of GRAPH-MO®

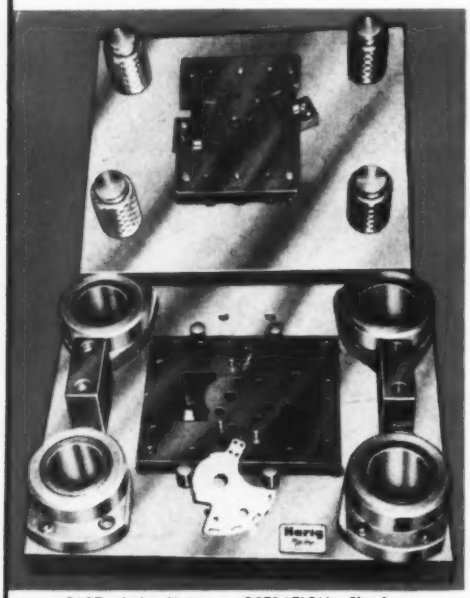
Now you can have all the advantages of high-quality graphitic tool steel in a new, convenient form. Specify Graph-Mo® in precision ground flats and save because:

1. **GRAPH-MO OUTWEARS** ordinary tool steels 3 to 1 because of free graphite particles and diamond hard carbides in its structure.
2. **SEMI-FINISHED** precision ground flats save you time and money by eliminating some preliminary operations.
3. **30% EASIER MACHINING** saves you still more when you specify Graph-Mo.
4. **GRAPH-MO'S HEAT TREATING** response is uniform, eliminates distortion in preparation.
5. **SPECIAL PROTECTIVE WRAPPING** assures top condition when you get ready to use your Graph-Mo precision ground flats.

There is only one Graph-Mo and the Timken Company makes it. Graph-Mo precision ground flats are available in 250 different sizes to give you maximum savings. Get your stock list from your local Timken steel distributor or write direct to: The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.*

TIMKEN GRAPHITIC STEELS ARE AVAILABLE FROM STEEL SERVICE CENTERS IN 40 CITIES IN THE UNITED STATES AND CANADA

CIRCLE INFORM-A-GRAM KEY NO. 11



ARE YOU OVERLOOKING A HARIG CARBIDE DIE APPLICATION?

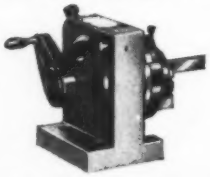
PART: Index Plate OPERATION: Shaving
MATERIAL: .063 C.R.S.

HARIG CARBIDE DIES ARE THE LOGICAL ANSWER TO LOW COST, HIGH PRODUCTION RUNS

Leading manufacturers are turning to Harig Carbide Dies for forming, drawing, shaving and notching in addition to blanking and piercing applications . . . because they consistently outproduce steel dies 10-15 to 1 (fewer grinds mean reduced maintenance and set-up costs), yet cost only ½ more than steel dies. On long stamping runs, one Harig Carbide Die can take the place of several steel dies—at a great savings to you. We would be pleased to consult with you on your next tooling program and suggest either Harig Carbide or Steel Dies to fit your needs.

HARIG GRINDING TOOLS

HARIG TML 6 x 12 SURFACE GRINDER. The tool and die makers precision grinder.

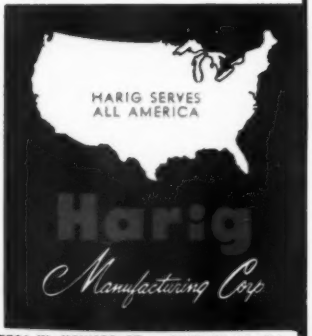


GRIND-ALL FIXTURE. The latest advancement in perforator grinding.

WHATEVER YOUR TOOLING REQUIREMENTS
. . . HARIG IS READY TO SERVE YOU!

ENGINEERING	PROGRESSIVE DIES
DESIGNING	MOLDING DIES
CARBIDE DIES	JIGS, FIXTURES & GAGES
LAMINATION DIES	SPECIAL MACHINING

WRITE FOR FREE CATALOG



5761 W. HOWARD ST. • CHICAGO 48, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 12

. . . Month's Talk from page 10

When gamma radiation is used for the detection of the radioactivity of the wear products on the chips a measure of the total or gross wear of the tool is obtained. However, if the radioisotope is also a beta emitter, it is possible to measure the flank and face wear of the cutting tool independently. In cutting, most of the tool wear products remain attached either to the side of the chip which moves across the rake face of the tool, or to the newly developed surface. In making a second cut, it is evident that the chip produced will have tool wear products attached to both sides of the chip, side A (the rake wear products), and side B (the flank wear products). The relative amounts of flank and rake wear can be determined by beta counting the respective sides of the chips. Since beta rays have low penetrating power, the rays coming from the chip side opposite the detector are stopped by the chip thickness and are not measured.

O. Hake of Germany has developed a method for differentiating flank and rake wear by means of gamma detection. Two cutting tools A and B, with only tool A being radioactive, are used simultaneously, but set at 180° with respect to each other in making a test cut. The chips cut with the radioactive tool have radioactive wear products which come from the rake side, while the chips cut with the non-radioactive tool have radioactive wear products which come from the flank side. By gamma counting the separate chips, a measure of the flank and rake wear of the tool is obtained.

Comparison of Methods

In order to be of real value to metal cutting research, the radioactive tool wear method must more readily yield results which are equivalent to and more accurate than those obtainable by conventional means. The data to be presented below are given to establish the validity and applicability of the radioactive tool wear test method and to compare the results obtained by this method with those obtained by conventional tool-life testing.

. . . Continued on page 16

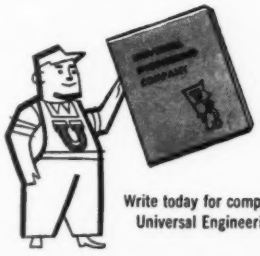
UNIVERSAL R & R DEBURRING TOOLS

with spring-loaded retractable blade give precision-cut edge or chamfer at high speed without chatter

Adjustable spring tension allows continuous contact with work-piece to eliminate chatter at high operating speeds. Free-floating blade permits self-alignment and uniform stock removal. Made in a full range of sizes to 1½" diameter.

Blades of the Universal R & R Deburring Tool are made of high speed steel, precision hardened and ground to close tolerances for interchangeability. May be used as horizontal deburrer in portable electric drill or in standard drill press.

For full information, write to Universal Engineering Company.



Write today for complete catalog of Universal Engineering products.

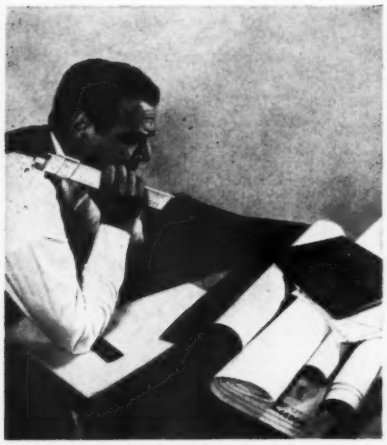
UNIVERSAL ENGINEERING COMPANY • FRANKENMUTH 8, MICHIGAN

216

CIRCLE INFORM-A-GRAM KEY NO. 13

NEW TOOL STEEL SERVICE

helps you estimate costs more accurately!



Estimating tooling costs, especially on new jobs,

becomes more accurate and profitable with Crucible's new Tool Steel Service.

This service enables you to use fewer grades of tool steels...

which you get to know inside-out! So, you can more accurately predict

machining and bench time, and response to heat treating.

And because you're completely familiar with all the basic grades you use...

you can pin-point your estimates and your actual costs.

For the complete story on all the cost reductions available with this service, call in a CRUCIBLE Service Engineer.

CRUCIBLE STEEL COMPANY OF AMERICA

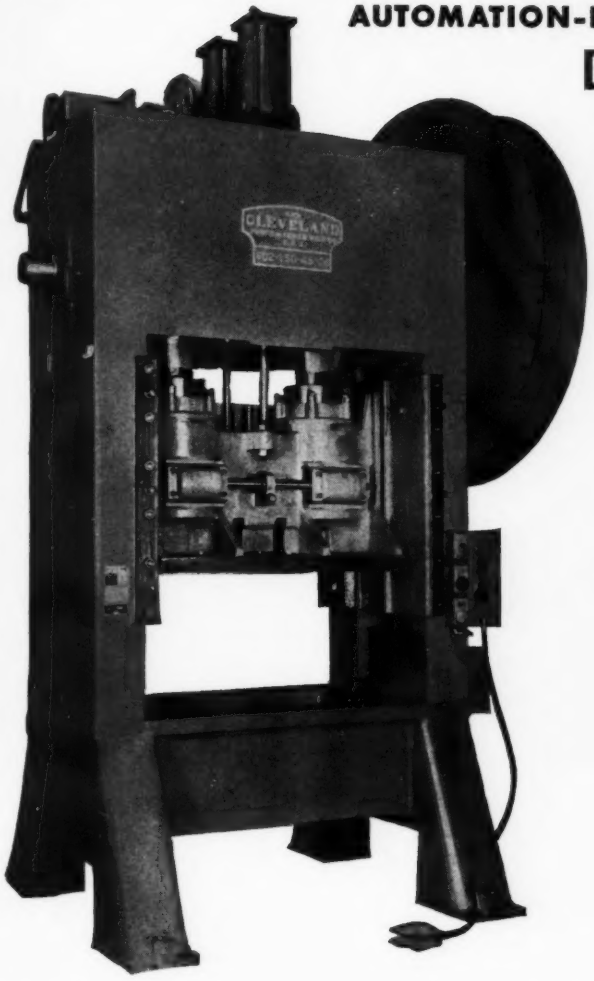
Branch Offices and Warehouses: Atlanta • Baltimore • Boston • Buffalo • Caldwell, N. J. • Charlotte • Chicago • Cincinnati • Cleveland • Columbus • Dallas • Dayton Denver • Detroit • Erie, Pa. • Grand Rapids • Houston • Indianapolis • Los Angeles • Miami • Milwaukee • Minneapolis • New Haven • New York • Philadelphia Pittsburgh • Portland, Ore. • Providence • Rockford • Salt Lake City • San Francisco • Seattle • Springfield, Mass. • St. Louis • E. Syracuse • Tampa • Toledo • Tulsa

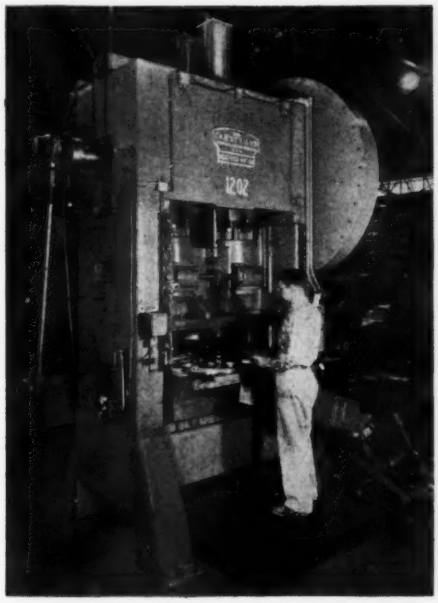
CRUCIBLE STEEL OF CANADA, LTD., SOREL, QUEBEC, CANADA

CIRCLE INFORM-A-GRAM KEY NO. 14

CLEVELAND

AUTOMATION-DESIGNED • COST-CUTTING DOUBLE CRANK PRESSES





Continuous, uninterrupted production is the "profit plus" this new Cleveland Double Crank Press is achieving at the Walker Manufacturing Company in Jackson, Michigan. This multi-station, automated Cleveland Press on each stroke pierces, extrudes and forms muffler heads at the rate of 45 strokes per minute (adjustable to 55 s.p.m.). This 150-ton press has a 48" x 36" bed and slide area, 8" stroke of slide with 6" adjustment, electrically controlled air-operated Cleveland (patented) Drum Type Clutch with spring loaded brake, auxiliary air brake on flywheel, and completely enclosed gears running in oil.

Let's talk MONEY—the money you save when you have a modern, cost-cutting Cleveland Press on your production line.

First there is *Production Money*—the money you make more of due to Cleveland's versatile, dependable performance.

Next there is *Downtime Money*—the money you need never worry about with a modern Cleveland Press—ruggedly built, designed for uninterrupted production—the press that pays its way by doing its job day after day.

Then there's *Profit Money*—the money that's extra for you on every production run because your Cleveland Press is precision-built with such secure and precise stroke action that dies last longer, delicate punches can be used with minimum breakage, and your production quality is topgrade, scrap-free.

When you buy a CLEVELAND PRESS, the *cost-cutting money* you save plus the *profit money* it earns for you far surpasses the cost of replacing that old press with a modern, quality-built Cleveland Press. That's why it will pay you to look into the advantages Cleveland Presses offer.

Write Today for Double Crank Press Catalog SD2-60

A-2189A

THE CLEVELAND PUNCH & SHEAR WORKS CO.
Established 1880

Power Presses
Fabricating Tools
Punching Tools & Dies

E. 40th and St. Clair Avenue, Cleveland 14, Ohio

CUT ACCUMULATED ERRORS to a minimum

with the

DIXI 75 horizontal optical jig borer

increased
ACCURACY
VERSATILITY
PRODUCTIVITY

Made in Switzerland
Measurement in inches

- Automatic positioning can be changed instantly to manual operation
- Projected optical setting—direct reading to .00005" for linear motions and 1 sec. of arc for built-in rotary table. Linear optics provided with adjustable zero reference
- Simplified controls functionally arranged for greater operating speed and efficiency
- 3" diameter boring spindle
- Increased capacity: table size 39⅜" x 32"; 29⅝" cross travel; 23⅝" longitudinal travel; 25⅝" vertical travel
- Hydraulic feeds and infinitely variable spindle speeds
- Rear support optional

MBI has engineers available for consultation, guarantees service by factory trained staff, and stocks spare parts in New York.—Join the long list of leading aircraft and manufacturing plants throughout the United States which are using the horizontal optical jig borer.

Demonstrations upon request at our conveniently located demonstration centers.

MBI

M. B. I. EXPORT & IMPORT LTD.
A DIVISION OF MACHINERY BUILDERS, INC.
475 Grand Concourse, Bronx 51, N. Y.
Swiss Accuracy plus U. S. Know-how

CIRCLE INFORM-A-GRAM KEY NO. 16

. . . Month's Talk from page 12

In the result of a series of test cuts taken on AISI 8650, the accumulated radioactivity, which is proportional to the amount of tool wear, is plotted against the optical flank wear. The accumulated gross wear (gamma counting) does correlate with the optical flank wear measurements. B. Colding of Sweden, in his investigation, has shown that the integrated rake wear, flank wear, and total wear when plotted against time gave linear relationships.

E. P. Nadeinskaya of the U.S.S.R., in his work with different grades of carbide tool materials has also shown a relationship between the accumulated activity and cutting time. Additionally, he reports that the tool life data as determined by the radioactive tool wear method agrees closely with tool-life data obtained by conventional flank wear measurements. H. Opitz and O. Hake of Germany, in their work with the double tool method, have also shown a linear relationship between integrated flank and rake wear and cutting time.

In order to establish completely the unit relationship between the radioactive tool wear test method and the conventional flank wear method, we have recently completed a series of tests in which the two methods were compared directly. The radioactive tool wear test data was obtained in the following manner. A series of 10 consecutive test cuts (each test cut constituting a tool wear determination) were made at each of the two test conditions being evaluated on the same cutting edge. The duration of each test cut was so chosen as to yield at least 20 gr of chips. If less than 20 gr of chips had been cut, in these particular tests, the effect of the entering and leaving of the cutting tool from the work material would have affected the results. Since there is the possibility of a "cross" or "conditioning" effect, i.e. the conditioning of the cutting edge when machining under test conditions A can influence the results when machining under test conditions B, it is necessary to run the tool "in" at each test con-

. . . Continued on page 22

—FOR THE MAN FROM RICHARD BROTHERS

When plant officials today are faced with a die construction or tough metal-piercing problem, chances are you'll find a place at their discussion table reserved for the man from Richard Brothers.

Our consulting engineers are always at your service—always ready to offer expert assistance, gained from their many years of experience. This is another reason why it pays to do business with the leader.

Specify R-B punches and related tools for all your metal-piercing needs. R-B stocks more than 10,000 different punches, die buttons and retainers. Whatever your requirements, they are the strongest, most durable you can buy.

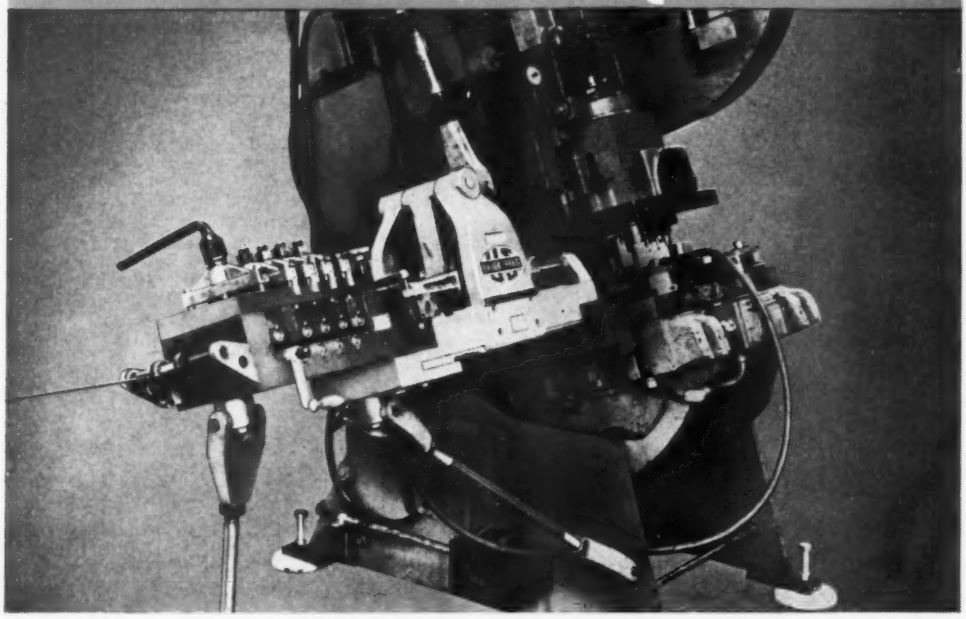
RELIABILITY QUALITY INTERCHANGEABILITY COMPLETE STOCK

RICHARD BROTHERS PUNCH DIVISION

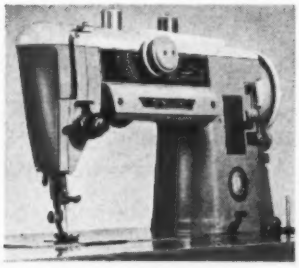
ALLIED PRODUCTS CORPORATION
26500 CAPITOL AVENUE • DETROIT 39, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 17

SINGER SELECTS U.S. TOOL COMPANY PRESS ROOM EQUIPMENT



U. S. Slide Feed, Model SF-68A and U. S. Plain Stock Straightener, Model SS-68A, in action at Elizabethport plant of The Singer Manufacturing Company.



The Singer Manufacturing Company successfully combines rapid output **and** critical quality control in the production of stampings used in the famous SLANT-O-MATIC* sewing machine.

In their Elizabethport, New Jersey plant, Singer uses U. S. Slide Feed, Model SF-68A, and U. S. Plain Stock Straightener, Model SS-68A, to feed coil stock into a 5 stage progressive die to produce perfect Thread Guides. Stock for the Singer Thread Guide is 1010 cold rolled steel, in coils, 1⅜" wide and .045" thick. Feed length is 1¾". The accuracy of this feed increases production — cuts rejections to the absolute minimum and provides the SLANT-O-MATIC machine with a finished component worthy of this fine machine.

To achieve greater efficiency and economy in your own stamping operations, investigate U. S. Press Room Equipment.

Write for Bulletins 85P and 151P.

Progressive strip showing extreme accuracy maintained by U. S. Slide Feed through this 5 stage operation.

MMT-PE MODERN MACHINE TOOLS PRODUCTION EFFICIENCY

US PRODUCTS

U.S. TOOL COMPANY, INC.

AMPERE (East Orange) NEW JERSEY

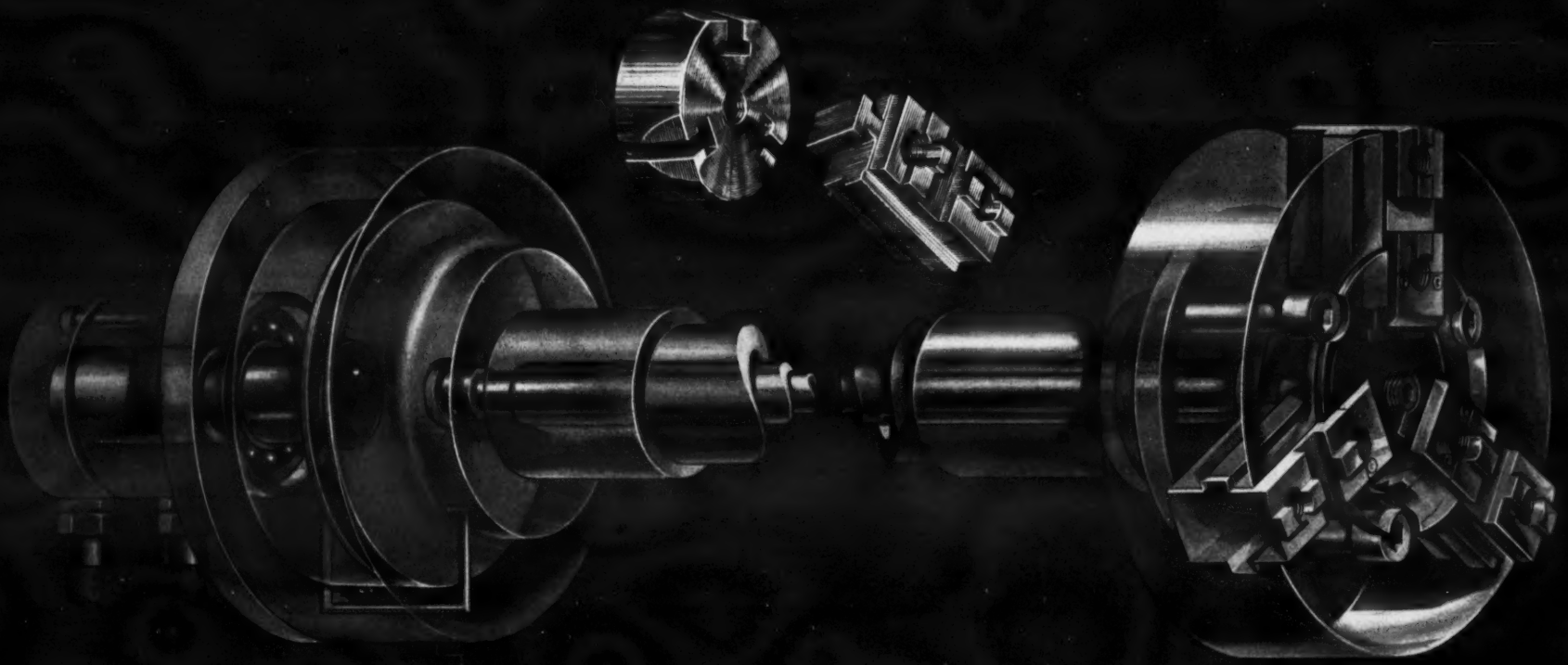
U. S. Multi-Slides® • U. S. Multi-Millers® • U. S. Automatic Press Room Equipment • U. S. Die Sets and Accessories

*SLANT-O-MATIC IS A TRADEMARK OF THE SINGER MFG. CO.

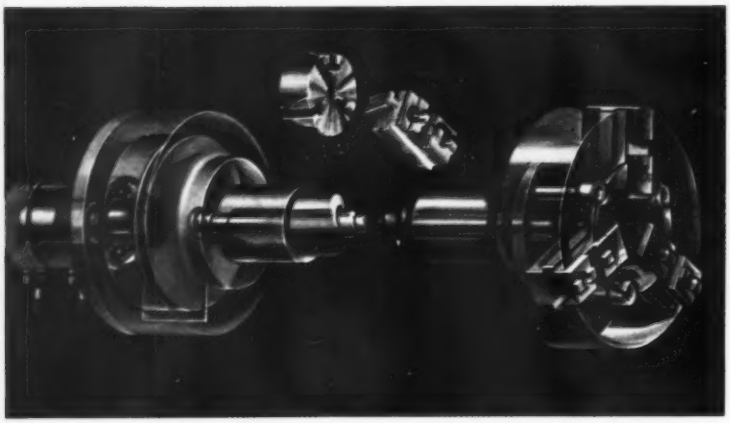
CIRCLE INFORM-A-GRAM KEY NO. 18

CIRCLE INFORM-A-GRAM KEY NO. 19

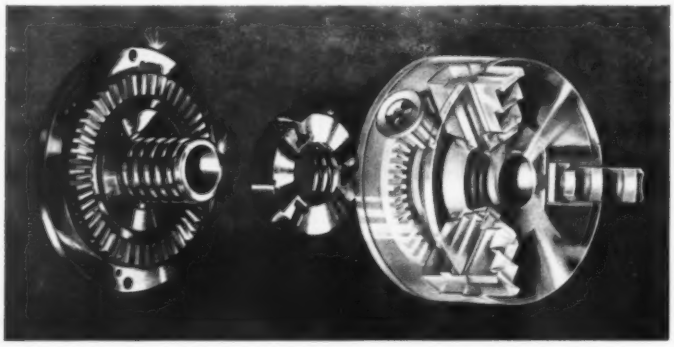
SKINNER PACKAGED POWER CHUCKING ASSEMBLY



Typical major chuck developments that come to you from SKINNER



Packaged power chucking assemblies are available for Atlas, Cintilathe, Hardinge, Logan, Regal, Sheldon, South Bend, and many similar lathes. Assemblies are also available for Brown & Sharpe and similar automatic and hand screw machines to permit chucking of cold drawn parts, small or odd shapes and castings. Packaged assemblies consist of chuck with two or three jaws, threaded drawbar and drawtube, rotating air cylinder, cylinder adaptor and necessary mounting for the individual machine.



Extra-heavy-duty Wedge-Screw chuck combines best features of power and hand chucks. It develops tremendous gripping power, high accuracy and repeatability by a unique principle. When the lug-type pinion is turned manually or by a power wrench, it engages the gear plate causing the screw to move the wedge. The force of the wedge on the jaws holds the work with tremendous power.

This Wedge-Screw chuck has such useful features as:

Accuracy—within .001 total indicator reading
Repeatability—within .0005 total indicator reading
Complete Range—no size limitation

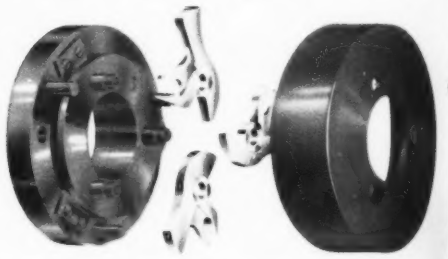
Many other features including over-tightening and operator protection, sealed operating mechanism, automatic lubrication, etc.

For complete details about packaged power chucking assemblies, indexing chucks, wedge-screw chucks, +GF+ Work Drivers, other chucks and chuck equipment, contact your Skinner Representative or Distributor, or write us at the address below.

Heavy-duty power chuck with jaws that index free under full pressure. Indexing is simple, easy, and fas The operator can index manually without touchi the work or releasing the pressure. Jaws are index by means of a lock screw and slide plate. Note t size and shape of the indexing pin. It fits firmly a positively into the indexing plate so that extrem accuracy of indexing is assured.

One or both jaws can be furnished with indexin mechanisms. As a result, you can index more position and smaller index angles. There is no need to buy new chuck for different indexing positions becaus index jaws or index components can be interchange quickly and easily.

This new Skinner chuck is available in all boc diameters from 12″ through 36″.



+GF+ Work Drivers distributed by Skinner, are th best clamping devices available for driving rough smooth blanks between centers. Eccentric jaws wi floating spring action hold firm, and any increase cutting tool pressure and or spindle speed automa cally increases the holding power of the work driv The jaws are easily reversed to accommodate chang direction of spindle rotation.

The protective hood covers all mechanism a provides means of manually opening and closing ja A slight turn of the hood, with surface cross-hatch for sure grip, opens jaws and holds them open un work is placed between centers—another turn releas jaws to grip work. **+GF+** Work Drivers are availab to hold work ranging in diameter from $1\frac{1}{16}$″ to 8″.

Maximum eccentricity of any piece is $\frac{3}{32}$″. Fi ished adaptor plates or rough castings are availab for mounting on all types of machines.

See these Skinner products at the Production Engineering Show Booths 212 & 214.

SKINNER CHUCKS®

THE CREST OF QUALITY

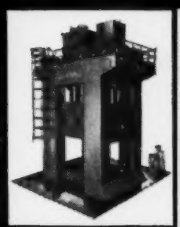
SKINNERCHUCKS

THE SKINNER CHUCK COMPANY • NEW BRITAIN, CONNECTICUT, U. S. A.

PRINTED IN

When it comes to Hydraulic Presses...

large or small

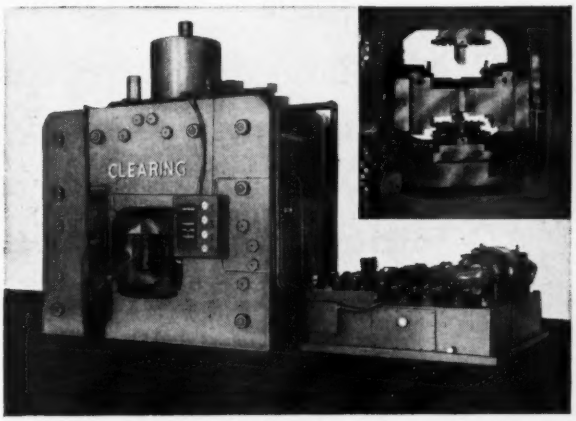


FOR ANY TYPE OF APPLICATION such as these metalworking drawing presses

WITH SPECIAL FEEDING EQUIPMENT as shown on this metal bonding machine

WITH ANY TYPE OF CONTROLS as seen on this rubber pad forming press

AND COMPLETE WITH THE TOOLING YOU NEED FOR THE JOB as we designed and built for this briquetting press



YOU GET THE MOST PRODUCTIVE EQUIPMENT AT CLEARING

There are no limitations on the type and size of hydraulic press equipment Clearing can design and build for you. No limitations either on the creative engineering you'll find at Clearing. Working with "new" metals—titanium, tantalum, columbium, uranium, zirconium?

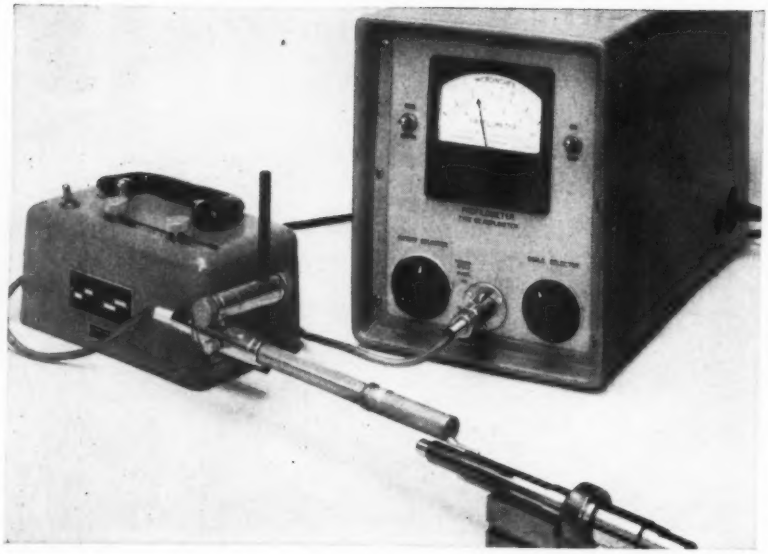
Clearing will have a more productive answer for you. Investigating new processes and production techniques? Call on Clearing. You'll find a forward looking team of engineers that can work with you to solve your manufacturing problems effectively and economically.

Clearing, division of U. S. Industries, Inc. also manufactures power presses of all types, dies and special tooling, and special equipment for the aircraft and missiles industry.

USI Clearing **DIVISION OF U.S. INDUSTRIES, INC.** 6499 W. 65th Street • Chicago 38, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 20

CIRCLE INFORM-A-GRAM KEY NO. 21



PERTINENT QUESTION:

WHEN do you need the Profilometer®?

FACTUAL ANSWER:

Whenever you must precisely *know* the roughness of *any* production surface — quickly, dependably, in microinches (arithmetical or rms).

FREE BULLETIN LT14 gives details — describes cost-saving applications. May we send you a copy?

MICROMETRICAL MMC MANUFACTURING COMPANY
3621 S. STATE RD. ANN ARBOR 6, MICHIGAN

MANUFACTURER OF THE PROFILOMETER® • PROFICORDER® • MICROCORDER®
WAVOMETER® • ANDEROMETER® • VAROMETER®
CIRCLE INFORM-A-GRAM KEY NO. 22

. . . Month's Talk from page 16

dition. This running "in" period consists of making one cut of a duration equal to 10 test cuts. The chip samples obtained after this running "in" period are then weighed and gamma counted and the quantity, counts per minute per gram of chip, which is a measure of the rate of the wear of the tool, is formed for each test cut. The average wear rate value is formed for each test condition and the ratio of these two represents the relative tool life. The conventional optical flank wear tests were carried out in the normal manner, with 0.030" flank wear being the criteria for tool life end point.

Examination of data . . . clearly indicates the unit relationship between the two methods of evaluating tool wear. Further, it has been established that the radioactive method is superior to the conventional method in terms of reproducibility. It is also quite evident that the radioactive method is much more rapid than the conventional method. The total time required for the radioactive tests was 3-1/2 work days as compared to 21 days for the conventional tests.

In all of the discussions so far, it has been assumed that all or nearly all of the wear products remain attached to the chips during the cutting operation with a negligible amount of wear products going into the environment, i.e. into the cutting fluid if a cutting fluid is used, or into the surrounding air if the cutting is performed dry. In the machining of steels and cast iron, this assumption has been borne out by numerous measurements. When machining with a cutting fluid it was established that upward of 95% of the tool wear products remain attached to the chips. B. Colding has also shown that in dry cutting the vast majority of the wear products remain attached to the chips.

In a recent study of the machinability characteristics of a number of aluminum alloys, it has been found that the percentage attachment of the wear products to the aluminum chips is quite different

. . . Continued on page 27

New MODEL 50 equips your lathes to do a lot more for a lot less!

$70.00 for the chuck

$65.00 for the collets

THE WORLD'S MOST MODERN COLLET CHUCK

Designed expressly for ATLAS, CLAUSING, DELTA, LOGAN, SHELDON, and SOUTH BEND LATHES

These and others of similar power and capacity now give top performance when equipped with the new Jacobs Model 50. Improve performance of your lathes. Increase spindle capacity as much as 42%. Get greater accuracy and stronger grip. It's easy and inexpensive with new Model 50 and its companion Rubber-Flex collets.

CONSIDER THESE FEATURES . . .

- **Gripping Power**
  Model 50 is made for heavy duty turning. It has tremendous gripping power.
- **Accuracy**
  Model 50 is factory tested—maximum runout .001" T.I.R. at the nose when properly mounted.
- **Thin Walled and Fragile Work**
  Always parallel Model 50 Rubber-Flex collet jaws permit chucking of tubing and fragile materials without crimping or scoring.
- **Range**
  The 10 Rubber-Flex collets in the 500 Series, developed especially for use with Model 50, cover a greater bar stock range than 63 old-fashioned steel collets. You can chuck any bar between 3/32" and 1-1/16" with this set of 10 collets.
- **Capacity**
  Model 50 eliminates capacity-wasting draw bar. You can increase spindle capacity up to 42%.
- **Adapters**
  Model 50 adapters are fully machined for immediate mounting. Available in all popular threads and American Standard L00 taper.
- **Price**
  Model 50 prices are revolutionary!
  $70.00 for the chuck.
  $65.00 for the complete set of 10 collets.

MODERNIZE YOUR LATHES WITH JACOBS MODEL 50 AND RUBBER-FLEX COLLETS. YOU CAN'T AFFORD NOT TO!

See your Jacobs industrial supply distributor. Give him the opportunity to prove these fantastic facts with a convincing demonstration at your desk! Call him today.

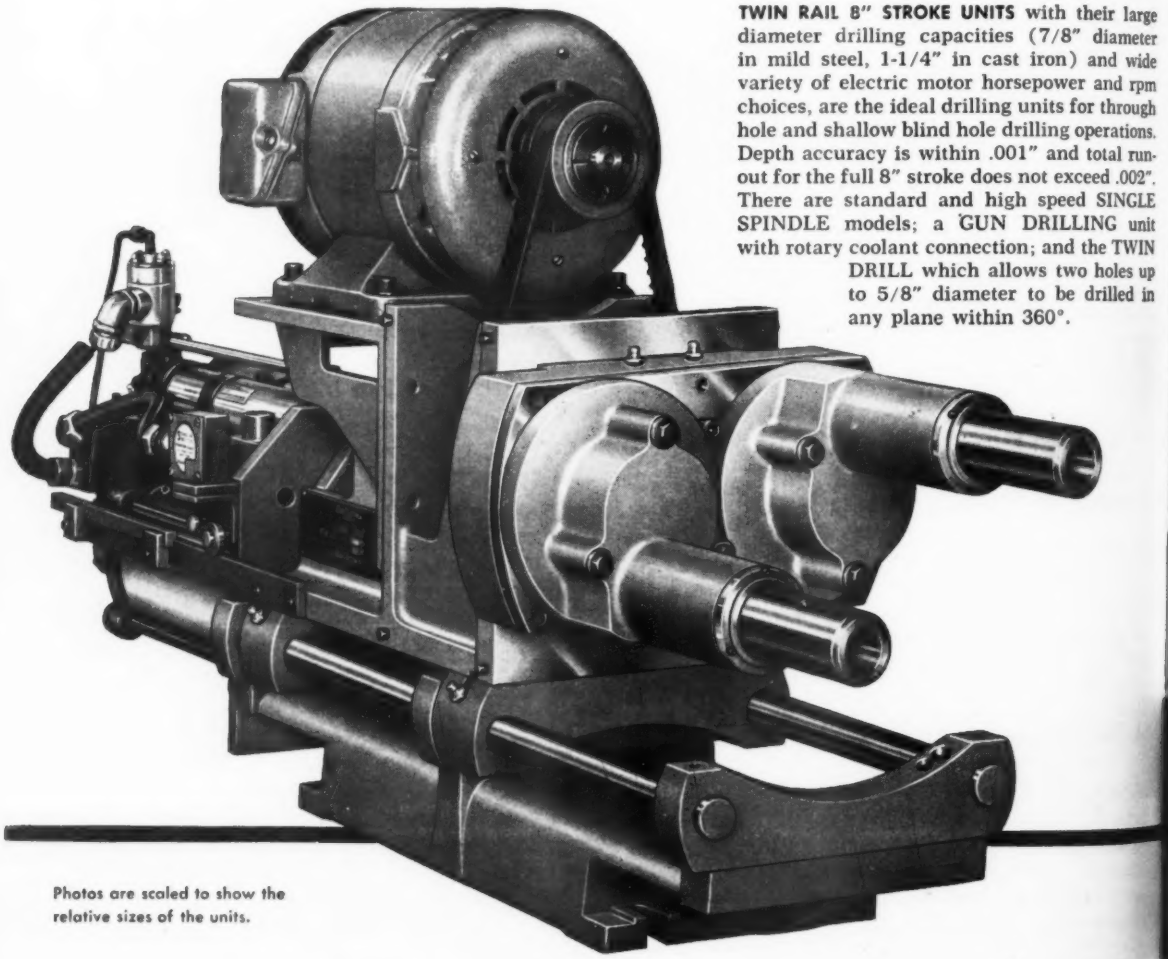
Jacobs CHUCKS

The Jacobs Manufacturing Co., West Hartford 10, Conn.

CIRCLE INFORM-A-GRAM KEY NO. 23

FOUR SOLUTIONS TO LOWER

These four basic Bellows-Valvair Drill Units, all air-powered, hydraulically controlled, electrically actuated, can make nearly any drilling operation more productive, less costly



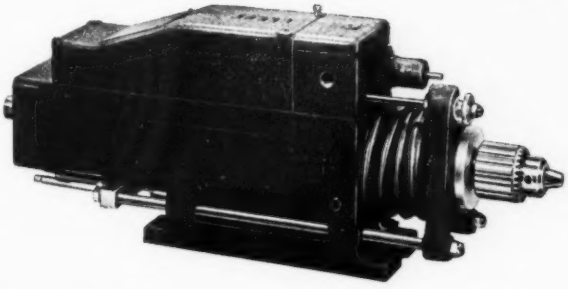
TWIN RAIL 8" STROKE UNITS with their large diameter drilling capacities (7/8" diameter in mild steel, 1-1/4" in cast iron) and wide variety of electric motor horsepower and rpm choices, are the ideal drilling units for through hole and shallow blind hole drilling operations. Depth accuracy is within .001" and total run-out for the full 8" stroke does not exceed .002". There are standard and high speed SINGLE SPINDLE models; a GUN DRILLING unit with rotary coolant connection; and the TWIN DRILL which allows two holes up to 5/8" diameter to be drilled in any plane within 360°.

Photos are scaled to show the relative sizes of the units.

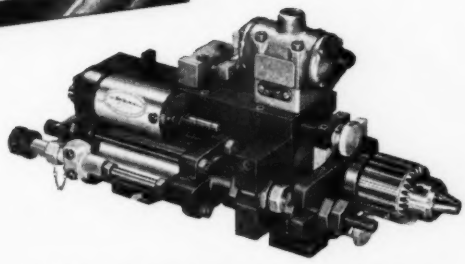
COSTS IN

DRILLING • TAPPING
BORING • REAMING
SPOT-FACING
COUNTER-BORING

"CARBI-DRILL" PRECISION BORING UNIT has so perfect an alignment that total runout of spindle to the machined base surface will not exceed .001" T.I.R. in the unit's full 4" stroke. Its drilling capacity is up to 5/8" diameter in mild steel, boring capacity is 1-1/2" to 4" diameter, dependent upon the material. Spindle speeds range from 609 to 6275 rpm (electric motor sizes from 3/4 to 2 hp). Power thrust at the quill is equal to 10 times applied air line pressure.



BELLOWS-LOCKE DRILLING and TAPPING UNITS are high speed drilling machines with a 3" stroke, drill capacity ranges from a No. 80 to 5/16" diameter. Rate of feed and speed of advance and retract are fully controllable. Units are available for pulley drive (as in photo), motor mounted parallel, and motor mounted "inline."



MODEL 22A DRILL HEAD has special advantages in close-quarter applications. The Hydro-Check (optional) provides a precision feed rate for the 2" stroke. Drill capacity is 3/16" diameter in mild steel. It can be mounted singly or in groups for synchronous operation . . . a versatile unit for drilling operations in wood, plastics, rubber, and light-gauge metals.

871C

Bellows-Valvair
AKRON 9, OHIO
DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

Bellows-Valvair, Division of IBEC, Akron 9, Ohio

Please send me full details on Bellows-Valvair Drill Units

TP-1060

Name_____

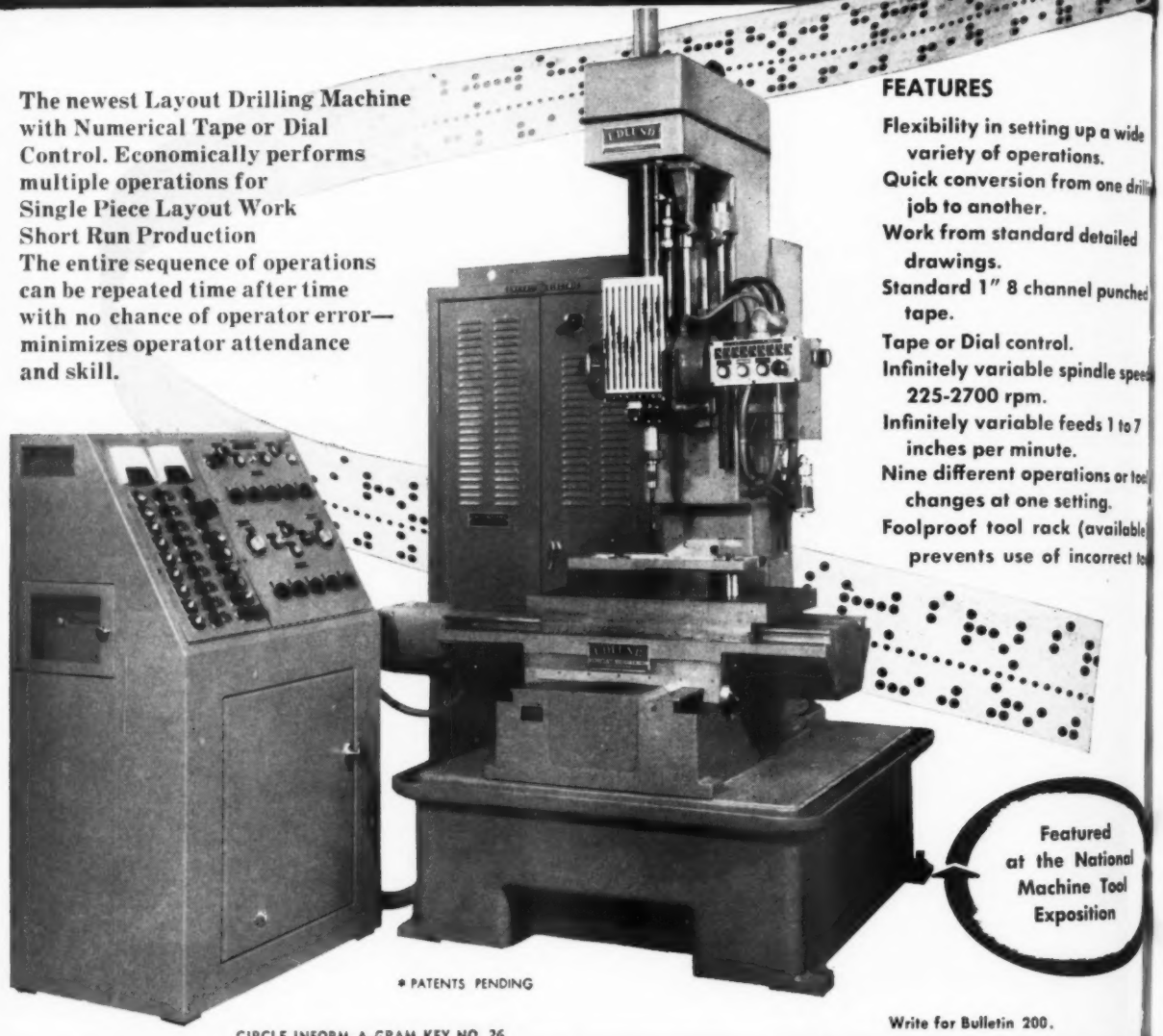
Company_____

Address_____

CIRCLE INFORM-A-GRAM KEY NO. 25

EDLUND-MATIC NUMERICAL TAPE CONTROLLED DRILLING & TAPPING MACHINE

The newest Layout Drilling Machine with Numerical Tape or Dial Control. Economically performs multiple operations for Single Piece Layout Work Short Run Production
The entire sequence of operations can be repeated time after time with no chance of operator error—minimizes operator attendance and skill.



FEATURES

- Flexibility in setting up a wide variety of operations.
- Quick conversion from one drill job to another.
- Work from standard detailed drawings.
- Standard 1" 8 channel punched tape.
- Tape or Dial control.
- Infinitely variable spindle speed 225-2700 rpm.
- Infinitely variable feeds 1 to 7 inches per minute.
- Nine different operations or tool changes at one setting.
- Foolproof tool rack (available) prevents use of incorrect to

Featured at the National Machine Tool Exposition

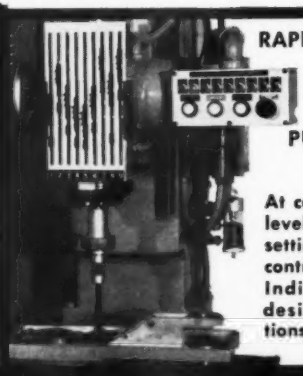
* PATENTS PENDING

CIRCLE INFORM-A-CRAM KEY NO. 26

Write for Bulletin 200.

CONTROL CONSOLE

Operation Selector Switch and Lights for nine operations
Spindle Speed and Feed Setting Knobs and Tachometers.
Table Positioning Dials for two axiis.
Zero Offset Dials.



RAPID ADVANCE AND FEED STOPS PLUS PENDANT PUSH BUTTON STATION

At convenient eye level for precision setting and easy control.
Indicator Lights designate operations.

EDLUND COMPOUND TABLE

A new concept in extremely rapid positioning table. Many exceptional features. Table Travel 14" x 20". 200"/per min.

Special Contract Job work can also be arranged with Edlund. Send Part, Blueprint and Requirements.

EDLUND
MACHINERY COMPANY

Cortland, New York Division of Harsco Corporation

EDLUND REPRESENTATIVES IN MAJOR CITIES

. . . Month's Talk from page 22

from steel chips. In the case of these aluminum alloys, the amount of tool wear products remaining attached to the chips varied between 41% for one alloy to 86% for another. Thus, in this investigation it would not have been valid to neglect this factor. It was, therefore, necessary to correct the wear rate data obtained by counting the wear products on the chips by the amount of wear products present in the cutting fluid. The amount in the cutting fluid was determined by collecting and counting the radioactivity present in the fluid. That the percentage of wear products remaining attached to the chips can vary significantly, does not however in any way invalidate the radioactive tool wear method, since in most cases it is a simple matter to account for this factor.

In the last 10 years since the introduction of the radioactive tool wear method, The Cincinnati Milling Machine Co. has been using this method on a routine basis for the evaluation of the effects of the numerous machining parameters as related to tool wear. In this time more than 600 tool wear evaluations, representing more than 6000 individual tool wear tests, have been completed. These tests have covered nearly all phases influencing tool wear, such as cutting speed, feed rate, work material, tool material, cutting fluid, tool geometry, method of tool preparation, effect of vibration and rigidity, etc.

While the application of the radioactive tool wear method has been limited almost exclusively to turning operations, some work has been done in milling. Here, as in most of the lathe tests, a linear relationship exists between wear and the amount of metal cut.

Use of radioisotopes in the form of radioactive cutting tools has provided the opportunity for the development of techniques useful in investigating the nature and mechanism of tool wear. By means of autoradiographs it is possible to detect and measure the nature and distribution of individual wear particles. An autoradiograph can be obtained by placing a chip cut

. . . Continued on page 30

Measure SPECIALS Easily with This New Universal Staging Fixture

Cut set-up problems in measuring small parts, cylindrical pieces, odd shapes. There's a new Universal Staging Fixture to position just about *any* part up to 3 inches in length. Mount the part and see the sharp image on the distortion-free 10-inch screen. Get micrometer readings to .001". So easy unskilled help can learn it in less than half a day. Other big savings, too . . . extremely low purchase price, *plus* almost unlimited versatility. With your choice of understage and surface illumination, and the new Universal Staging Fixtures, you can just about write off special jigs and fixtures as a cost factor.

Find out more about how B&L can simplify your precision inspection. There's a complete line of instruments to help you. Mail the coupon now.

BAUSCH & LOMB INCORPORATED
79710 Bausch St., Rochester 2, N.Y.

Please send literature on:

- ☐ Bench Comparator, D-297
- ☐ Universal Staging Fixture, D-2007
- ☐ Toolmakers' Microscope
- ☐ StereoZoom Microscopes, D-15
- ☐ Scratch Depth Gage, D-2004
- ☐ Optical Aids, D-1059

NAME .....

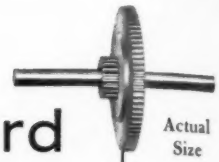
COMPANY .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....

BAUSCH & LOMB
SINCE 1853

CIRCLE INFORM-A-GRAM KEY NO. 27


Actual Size

now you can check & record fine-pitch gear accuracy

at 1600 magnifications

on the No. 4 Fellows Red Liner

Now, the No. 4 Red Liner makes "composite" checks on the finest instrument gears with unbelievable accuracy and sensitivity. 1600 to 1 magnifications are obtained with the electrical recording system which gives a written, unbiased record for instant reading or for proof-of-accuracy files.

One report states — "11 teeth, 200 D. P. pinion backed up to a 100 tooth gear on a cluster, checked easily on the No. 4 Red Liner."

The job shown is 96 pitch with 22 teeth on the small gear and 80 teeth on the larger gear. The pinion shaft rides in vees in a turret-type fixture.

Fellows inspection units cover a range from the tiniest instrument gear up to some that are 24 inches in diameter.

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Branch Offices:
1048 North Woodward Ave., Royal Oak, Mich.
150 West Pleasant Ave., Maywood, N. J.
5835 West North Avenue, Chicago 39
6214 West Manchester Ave., Los Angeles 45

Investigate the full line of ... inspection equipment

No. 4 Fine-Pitch Red Liner

No. 8M Red Liner

No. 20M Red Liner

No. 12H Lead Measuring

No. 12M Involute Measuring

THE PRECISION LINE

Fellows *Gear Production Equipment*

CIRCLE INFORM-A-GRAM KEY NO. 29

SYLVANIA
• SYLVANIA ELECTRIC PRODUCTS, INC.

A name known throughout the world for quality electrical products utilizes . . .

PERKINS PRESSES

because they embody the most advanced style of controls and devices to speed production without sacrificing quality.

PERKINS PRESSES also offer a wide choice of accessories to make their standard inclinables adaptable to the widest possible range of job assignments.

LET OUR ENGINEERS SHOW YOU HOW . . .
Perkins Presses can become an integral part of the production process in your plant.

Call in a Perkins field engineer and let him help you get maximum production in your press room.

PERKINS
MACHINE COMPANY
WARREN, MASS., U.S.A.

Write Dept. TP-18

CIRCLE INFORM-A-GRAM KEY NO. 30

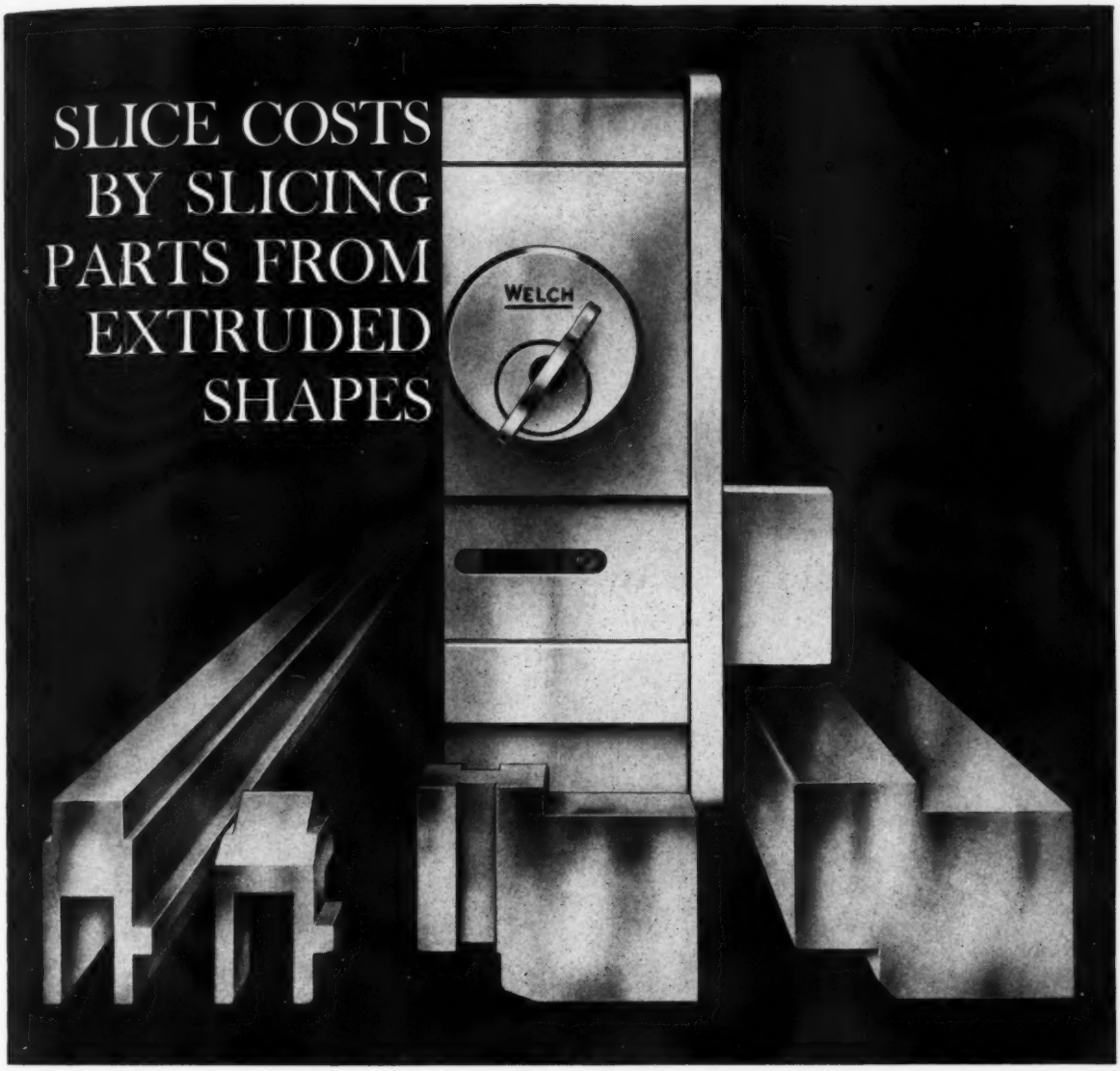
with a radioactive tool in contact with photographic film and allowing the radiation emitted by the wear particles to expose the film.

In preparing the chips for autoradiographing, a number of precautions have to be taken. Since most chips are not flat enough for autoradiographing directly, it is necessary to carefully anneal the chip in a vacuum furnace prior to flattening, in order to prevent the formation of an oxide film which can disturb the wear particles on the chips. Chips must be handled with care since some of the wear particles can easily be detached.

I. Finne and E. Rabinowicz in their study of the transfer of work material to a cutting tool used a variation of the radioactive tool wear method. In place of radioactive tools, they used ordinary tools to cut a radioactive work material — copper. The amount of transfer was determined by making quantitative autoradiographs of the cutting tools. They found that the amount of metal transfer to the cutting face was of the same order of magnitude as would be produced in a sliding experiment under similar condition. The use of lubricants was found to reduce the amount of metal transfer.

The use of radioisotopes in the form of irradiated cutting tools has proven to be a very powerful tool for investigating the problems of tool wear as influenced by the numerous machining parameters. It not only provides a method for rapidly and accurately evaluating these parameters, but offers a means for studying the actual mechanism of tool wear as well. Much of the information now available was unattainable by more conventional techniques.

While the radioactive tool wear method does have some distinct advantages over the conventional methods of obtaining tool wear information, and for investigating the mechanism of tool wear, it does not replace or supersede the conventional methods, for much information can be obtained by the conventional methods. Combined use of the two methods will go a long way in solving the practical problems associated with the cutting process and shed more light on the mechanism of tool wear.



Fabricating parts from long lengths of "premachined" shapes reduces machining, scrap, and finishing

The lock components shown above are typical of some 20 different precision brass parts which Welch, Inc., Waukegan, Ill., makes for its broad line of locks and latches, from Anaconda extruded shapes.

Welch works closely with Anaconda specialists from early design stages. New lock mechanisms are built around parts which can be cut by a metal slitting saw from long lengths of extruded shapes with minimum subsequent machining and scrap. The use of bar stock is never considered when there is the slightest possibility of designing savings into a part by means of a brass extrusion.

Superior quality, too. Parts made from extruded shapes are characterized by their strong, homogeneous, wrought-metal structure. And the smooth, extruded surfaces reduce many finishing operations.

More and more manufacturers are cutting fabricating costs *and* maintaining quality by using these preformed or, in effect, "premachined" shapes. For imaginative and practical help in adapting extruded shapes to the economical production of intricate parts, call your Anaconda representative or write: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 6044

Extruded Shapes • Special-Shape Tubes • Die-Pressed Forgings

ANACONDA®

products made by The American Brass Company

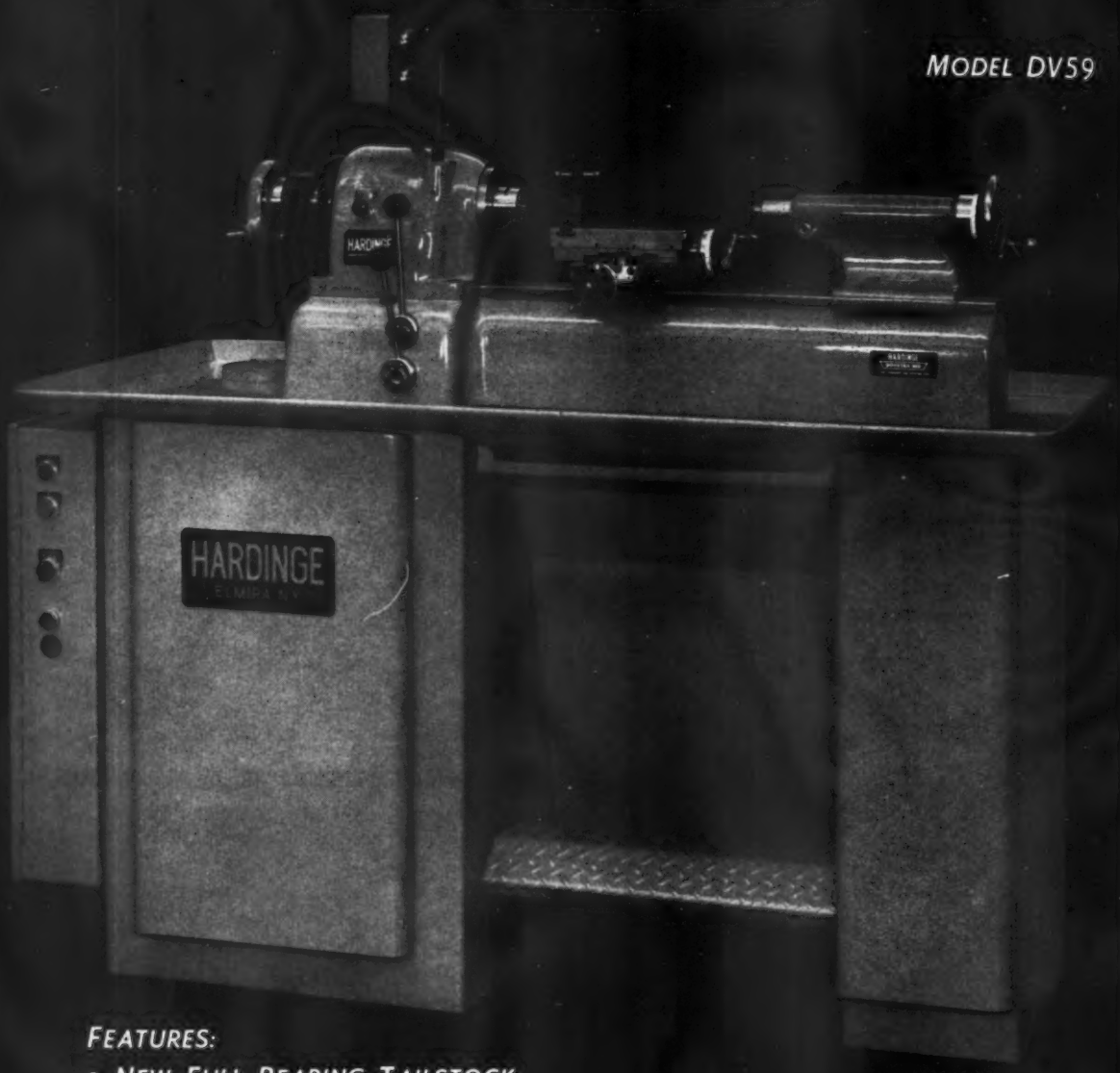
CIRCLE INFORM-A-GRAM KEY NO. 31

THE NEW

HARDINGE
ELMIRA, N.Y.

HARDINGE HIGH SPEED PRECISION LATHE

MODEL DV59



FEATURES:

- NEW FULL BEARING TAILSTOCK
- NEW PRELOADED BALL BEARING HEADSTOCK
- NEW ELECTRIC INTERLOCK FOR SPINDLE LOCK PIN
- NEW COMPOUND SLIDE REST WITH HARDENED AND GROUND STEEL TOOL POST SLIDE

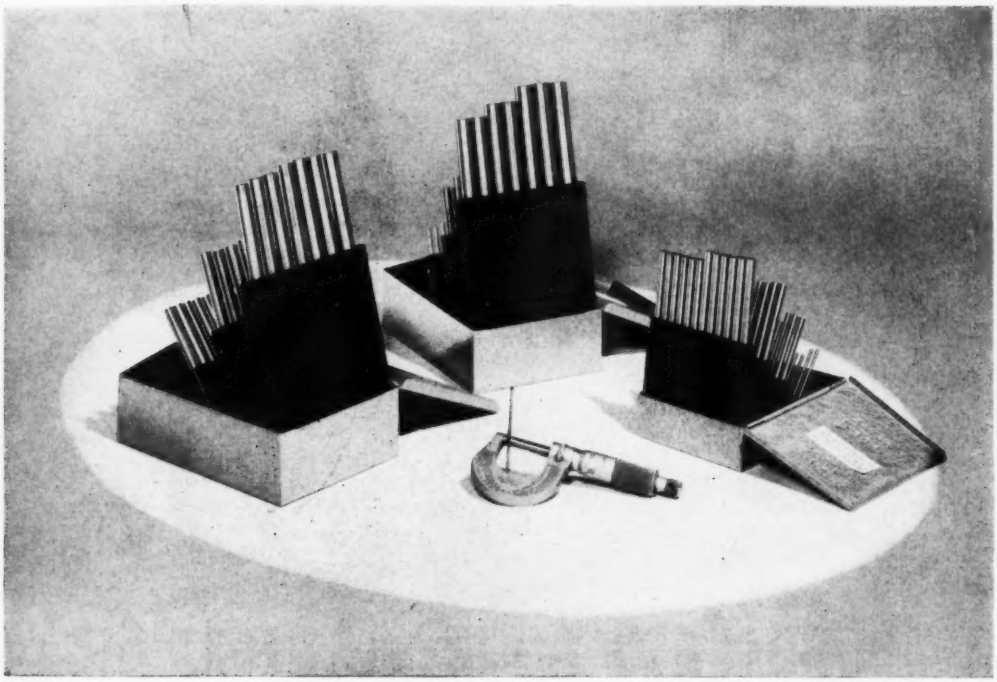
WRITE FOR FREE BULLETIN

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE

WILLIAM T. HUTCHINSON CO.
53 BROWN AVENUE SPRINGFIELD, NEW JERSEY

HUTCHINSON HSS BLANKS



115 Pieces – COMPLETE – .040" to .500" – $88.00

your choice of two tolerances
+ .0002" – .0000
or
+ .0000 – .0002"

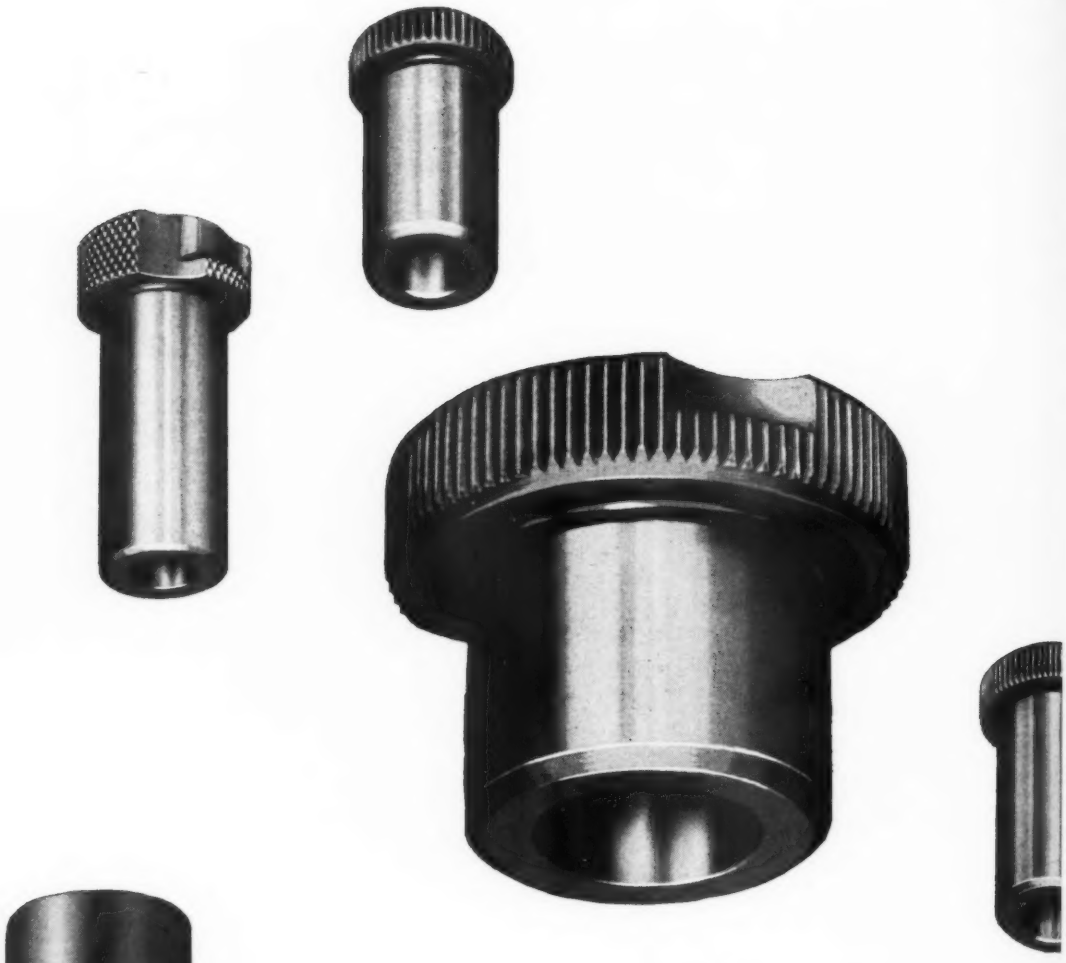
JOBBER SET	LETTER SET	WIRE SET
$32.27	$29.03	$27.40
in Huot Index	in Huot Index	in Huot Index

M2 — HIGH SPEED STEEL — 64 "C" scale hard — gage tolerance — mirror finish — parallel ground.

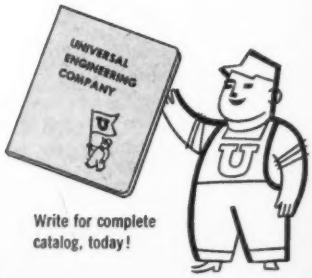
ANY DECIMAL DIAMETER OF STANDARD LENGTH
.012" TO 1.000" SHIPPED ON 24 HOUR NOTICE

CIRCLE INFORM-A-GRAM KEY NO. 32

CIRCLE INFORM-A-GRAM KEY NO. 33



for speed and accuracy in production
it pays to use UNIVERSAL DRILL BUSHINGS



Write for complete catalog, today!

UNIVERSAL ENGINEERING COMPANY • FRANKENMUTH 8, MICH.

214

CIRCLE INFORMATION PROGRAM KEY NO. 34

does both bar and chucking work

Why settle for less? The NEW Gisholt AR (Automatic Ram) brings automatic cycle efficiency to both bar and chucking work—gives you low-cost automatic production at fixed rates on both small lots and long runs.

Here are some of the advantages this new AR gives you:

1. Converts in 1 hour from chucking to bar work
2. Sets up as fast as any ram-type turret lathe—much faster than any other automatic
3. Saves time with infinite feeds, 16 speeds, plus a 25 h.p. motor to take full advantage of carbides
4. Machines more surfaces per chucking with: a hexagon turret and two cross-slide stations—up to a 15″ chuck—a 14″ turret stroke and 10″ cross-slide travel

With this new automatic, even a new man can get consistent quality at fixed production rates. He simply chucks, starts the cycle and removes the finished part. On bar work he does even less.

Ask your Gisholt Representative for your personal, desk-side demonstration showing how easy it is to set up and operate the AR. Ask him to explain the cost-cutting features that add up to increased profits on your work.

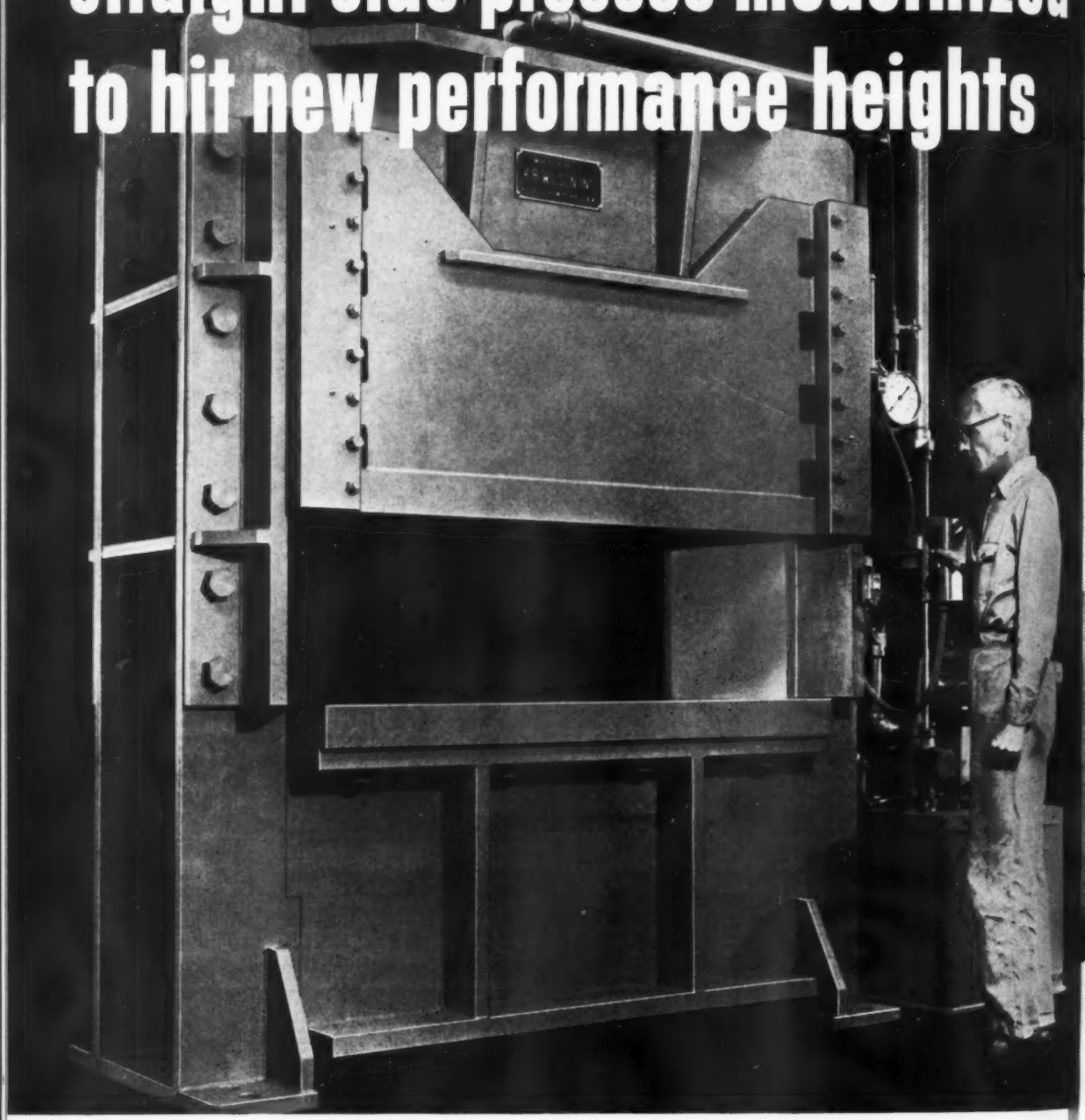
GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

Turret Lathes • Automatic Lathes • Balancers •
Superfinishers • Threading Lathes •
Factory-Rebuilt Machines with New-Machine Guarantee

Investigate Gisholt's Extended Payment and Leasing Plans

CIRCLE INFORM-A-GRAM KEY NO. 35

straight side presses modernized to hit new performance heights



Here's smooth hydraulic action at its best! Newly modernized, the KRW 25-1000 ton line of straight side, single action presses offers you the most profitable answer to a wide range of work: bending, forming, blanking, briquetting, broaching, coining, embossing, forging, straightening and trimming.

Boasting clean-cut, neat exteriors, these versatile machines have been engineered to improve productivity . . . *quantity-wise, quality-wise and dollar-wise!*

KRW's rugged, welded frame construction is unequalled for strength and rigidity. Members are keyed and fitted together to insure precision performance. Angle gibs, located at each corner of the sliding platen, maintain platen-to-bed parallelism to make utmost accuracy and longer die life a certainty.

Available with either up-acting or down-acting platens, KRW Straight Side, Single Action Presses can be outfitted with manual lever or electric push buttons for single or continuous cycling. Compact, easy-to-adjust and fully responsive, KRW hydraulic systems assure instant, complete press control.

More detailed information (including specs) can be obtained by writing for illustrated Bulletin 5-B. K. R. Wilson, Inc., 218 Main St., Arcade, N. Y.

KRW HYDRAULIC PRESSES

CIRCLE INFORM-A-GRAM KEY NO. 36

CIRCLE INFORM-A-GRAM KEY NO.

TOOL NEWS

★ *Since 1957, applied in 20,000 special boring, facing, turning, milling and chamfering tools*

★ *Simplifies combining of operations*

WESSON Standardized Cartridge System Revolutionizes Special Tool Field

This little cartridge is the simple answer to thousands of special tool needs.

In only 3 years, the Wesson adjustable cartridge tooling system has revolutionized the design of thousands of multiple point tools for boring, milling, chamfering, turning and facing. (For examples, turn the page.)

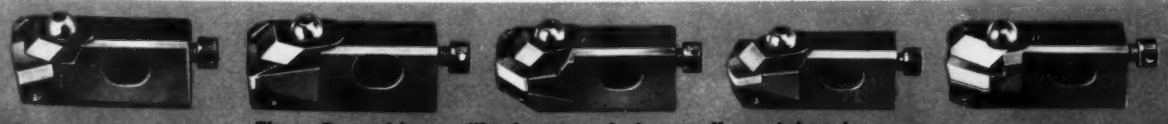
The standard 5 styles shown below, alone, cover the vast majority of all special multi-point tool requirements resulting in minimum inventory cost, minimum tool design and fabricating cost. From 2 to 18 or more operations may be combined in a single tool with the Wesson cartridges. Adjustable in two directions, the cartridges with their throw-away inserts cut down-time for setup and tool changes. They come in 5 styles (for square, triangular or pentagonal inserts) and in left and right hand types.

The same cartridge can be used for machining different materials simply by switching to the required Wessonmetal grade. When a tool is no longer needed, cartridges can be switched to other uses. Damaged cartridges can be quickly replaced from stock, avoid high special tool replacement cost.

You can often use special tools for different size parts by simply adjusting the cartridges. Designed to provide maximum chip clearance and to protect the cutter body, cartridges are rigidly retained in the body.

Get our latest bulletin (C-660) on these standardized cartridges by circling A-2 on the Readers' Service Card. Circle A-1 and our representative in your area will show you numerous illustrations of some of the 20,000 different special tools in which these cartridges have proven themselves.

Please turn the page . .

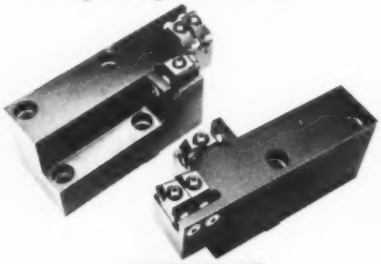


These 5 cartridges will take care of almost all special tools.

Some of the many specials using WESSON cartridges

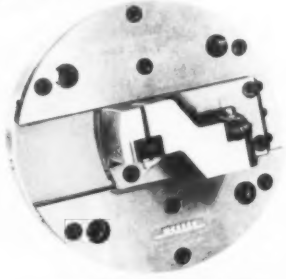
AUTO TRANSMISSION CASE

15 different operations with one tool —boring, facing, chamfering.



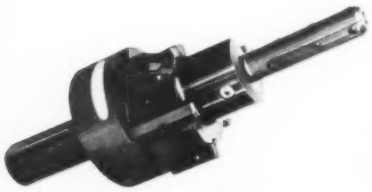
AUTOMOTIVE

Simple tool block for multiple turning and chamfering.



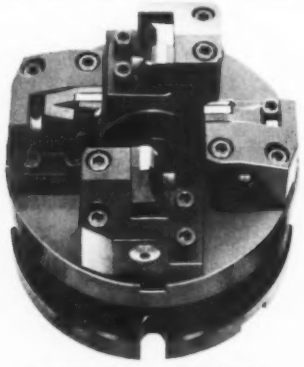
HYDRAULIC VALVES

Interchangeable preset blocks and cartridges face ends of all valve sizes.



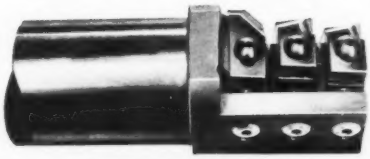
ELECTRIC MOTORS

Bores and faces all bearings, chamfers OD, ID on various sizes of motors.



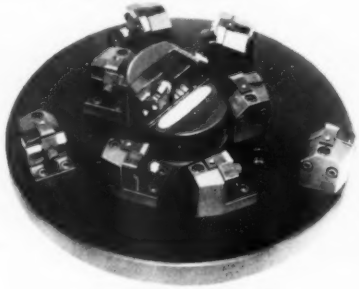
STEERING ASSEMBLIES

Hollow mill turns ends of control arm shafts.



AIRCRAFT ENGINES

Simple boring bars perform multiple boring and chamfering.

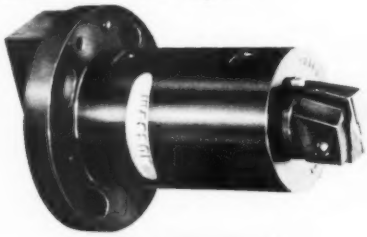


CLUTCH HOUSING

Bores and faces clutch housing of cast aluminum. Facing units have special cartridges.

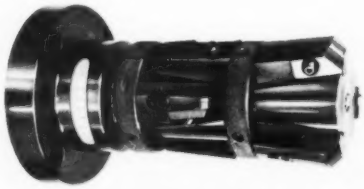
BRAKE DRUMS

This boring tool R & F bores brake drums with 8 cartridges.



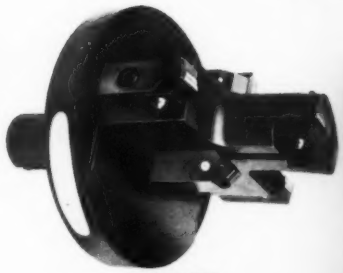
ALUMINUM SLABS

Milling cutter units to closely control face run-out in slab milling of aluminum ingots.



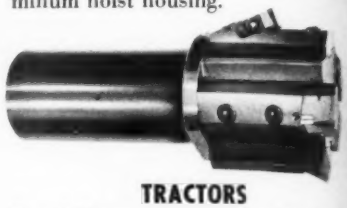
CONNECTING RODS

Rough and finish bores big ends of rods, Three cartridges per diameter simultaneously adjustable.



HOISTS

Semi-finish bores, chamfers end and faces flange in one operation on aluminum hoist housing.

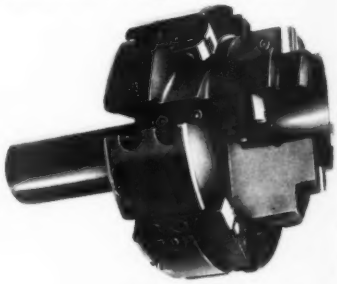


TRACTORS

Rough bores, grooves, chamfers both ends and finish bores collar coupling.

ROAD BUILDING EQUIPMENT

R & F connecting rods to a diameter tolerance of only ±0.0002 in.



CONVERTER

Bores, counterbores, turns ID of hub, triple-faces and double-chamfers converter housing.

tools Wesson carbide Wessonmetal

WESSON COMPANY, DEPT. AB

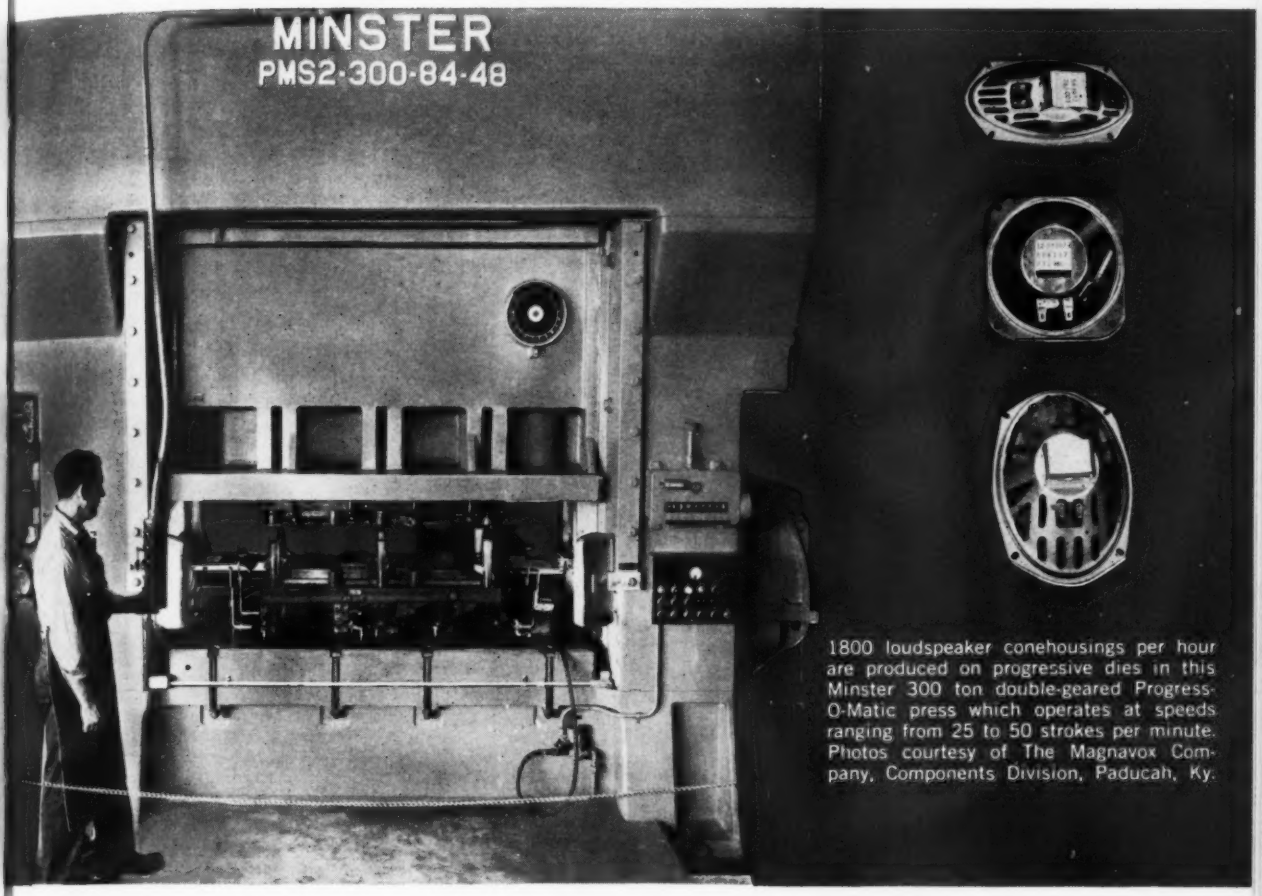
1220 Woodward Heights Blvd., Detroit 20, Mich.

IN CANADA:

WESSON CUTTING TOOLS, LTD.

93 Judge Road, Toronto 18, Ontario

AUTOMATIC PRODUCTION reduces costs...savings pay for the press

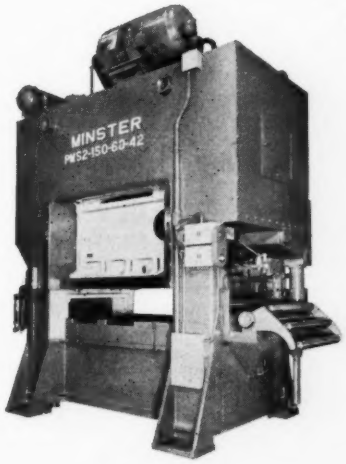


1800 loudspeaker conehousings per hour are produced on progressive dies in this Minster 300 ton double-geared Progress-O-Matic press which operates at speeds ranging from 25 to 50 strokes per minute. Photos courtesy of The Magnavox Company, Components Division, Paducah, Ky.

For Magnavox . . . this MINSTER Progress-O-Matic Press

saves 600% direct labor cost
saves 90% die maintenance cost
saves 75% die set-up time cost
saves 25% material cost
cut finished part cost by 50%

The interesting story on how Magnavox engineers achieved this outstanding cost reduction is contained in a reprint of an article which recently appeared in a leading magazine. May we send you a copy? Write to:



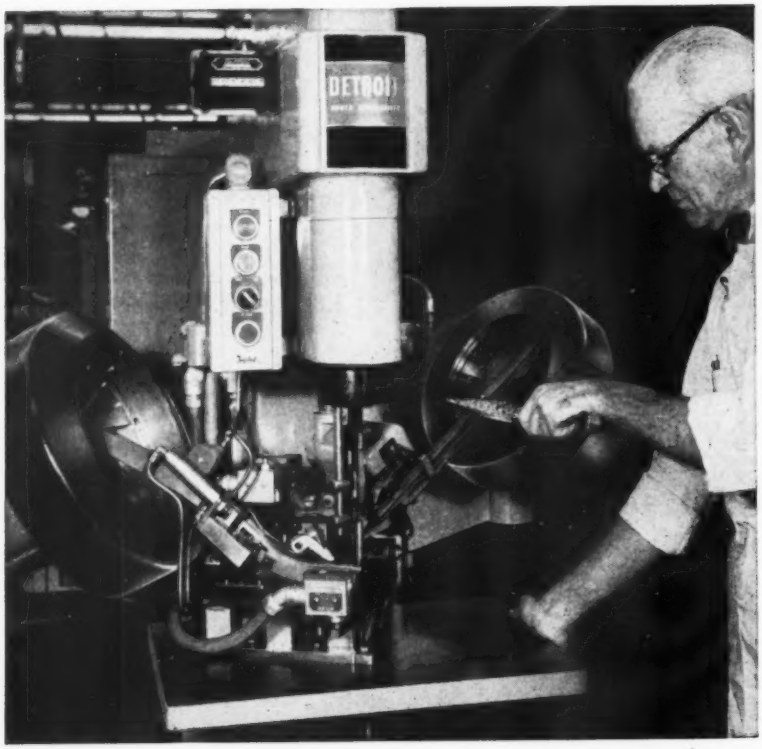
The Minster Machine Company • Minster, Ohio

MINSTER®

CIRCLE INFORM-A-GRAM KEY NO. 38

CIRCLE INFORM-A-GRAM KEY NO. 39

19,000 ASSEMBLIES...



all in a day's work for DPS special assembly machines

True to its name, Automatic Electric Company has made this small parts assembly *fully automatic* with a DPS assembly machine. A subsidiary of General Telephone & Electronics, Northlake, Ill. the company has realized increased capacity with fewer rejects on telephone terminal assemblies. This type machine in similar assembly operations has paid for itself in less than a year from savings over previous method.

If you have a small parts assembly problem, talk it through with Detroit Power Screwdriver Company. Industry's most advanced design screwdriving machine is the result of more than three decades of specialization. Add to this a complete line of parts feeders (vibratory, rotary and elevating) and you're assured an operation that is automatic and effortless. Write today for full information.

DETROIT POWER SCREWDRIVER COMPANY 15,135

2827 W. Fort St. • Detroit 16, Michigan

A Subsidiary of Link-Belt Company

CIRCLE INFORM-A-GRAM KEY NO. 40

Union Twist Drill Co. has announced that **Jack L. Hornbeck** has joined the **S. W. Card Div'n** as field engineering covering Northern California, and **Richard Kandarin** in Michigan.

Douglas Tool Co. has appointed **Steve Herzina** sales manager.

Joseph E. Kessler has taken over as technical sales director of the **Van Straaten Chemical Co.** He was formerly head of the Pittsburgh sales region.

Newly appointed manager of **Crucible Steel Co.'s** Cincinnati sales branch is **Joseph W. Duba.**

Appointment of **H. E. Polk** as a regional sales representative of **USI Robodyne Div'n of U.S. Industries, Inc.,** was announced recently.

Taylor S. Iams is now a sales engineer in the Pittsburgh area for **Macklin Company.**

Roger Thomas has been named manager of sales in the Chicago regional sales territory for the **Mid-West Abrasive Company.**

Appointment of **William H. Morrin** to the position of general sales manager has been announced by **Alpha Press & Machine, Inc.**

The **Abrasives Div'n of Elgin National Watch Company** has named **Richard Hart** as a direct field engineer for the diamond products of the division. He'll cover the Dayton-Cincinnati section as well as eastern Kentucky, eastern Tennessee, and Georgia.

Andrew Charney is now a sales engineer for the **Veet Machine Tool Div'n of Veet Industries.**

Robert A. Ferguson, assistant to the vice president in charge of sales at **Latrobe Steel Company,** has been named manager of marketing there. He succeeds **Marshall Schaber,** who has been named assistant to the president.

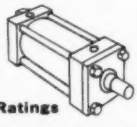
The Carpenter Steel Co. has named **William J. Ervin** as assistant to its midwestern regional manager, to work out of Indianapolis.

THIS ...IS WHAT YOU BUY!

POWER — clean, dry, drip-free power at the business end of a Hannifin piston rod is the result of Hannifin extra quality, and at no extra cost. Bores are honed to 15 RMS or finer . . . piston rods are case hardened, plated and polished to 10 RMS or better. Cartridge gland, removable without dismantling cylinder, has exclusive Hannifin-developed "Lipseal®-Wiperseal" combination for a truly drip-free rod.

Modern straight thread leak-proof ports for easily positioned fittings are available at no extra cost on hydraulic cylinders.

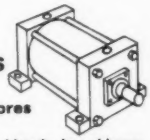
HYDRAULIC CYLINDERS



Two Pressure Ratings

2000 psi (3000 psi non shock), the famous heavy duty Hannifin Series "H" in 1½"to 12" bore.
1000 psi, Series "L", 1" to 8" bore, Hannifin quality in a lighter cylinder. Full compliance JIC Hydraulic Specs.

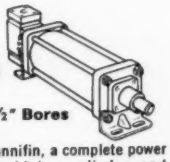
AIR CYLINDERS



1½" to 14" Bores

Series "A"—steel heads, honed brass body for corrosion resistance. Hardened and hard chrome plated piston rod. For all heavy duty air service. Easily modified for water service. Full compliance JIC Pneumatic Specs.

AIR MOTORS



1¾" to 4½" Bores

New from Hannifin, a complete power package combining cylinder and solenoid valve. Only one air line connection. Four mounting styles. Interchangeable mounting dimensions for most applications.

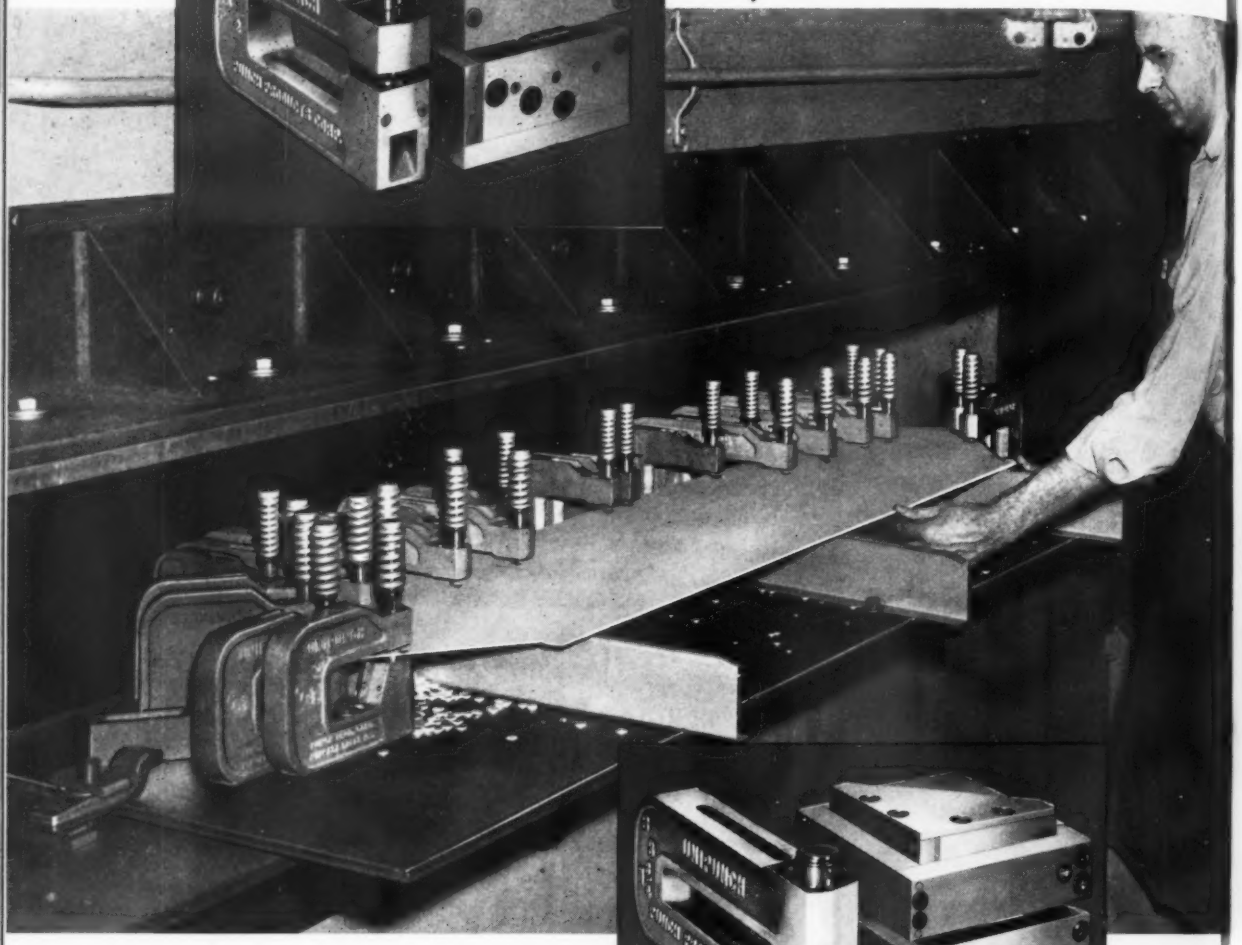
PARKER HANNIFIN CORPORATION

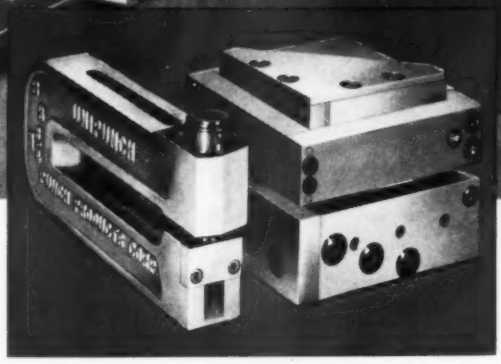
HANNIFIN COMPANY
A DIVISION
563 South Wolf Road • Des Plaines, Illinois
PNEUMATIC AND HYDRAULIC SYSTEM COMPONENTS

3128-PH

CIRCLE INFORM-A-GRAM KEY NO. 41

UNIPUNCH SERIES "A" Hole Punching Units punch round and shaped holes up to 3" in diameter in up to ¼" mild steel (Series "AH" for up to ½" thick). Notching Units for corner, edge, vee and special shaped notches may be used in combination setups with hole punching units. Both types of Series "A" Units have popular standard 8¾" shut height and 3½" die height.





UNIPUNCH SERIES "B" Hole Punching Units punch round and shaped holes up to 3½" in diameter in up to ¼" thick mild steel or equivalent. Standard or special Series "B" Notching Units may be used in combination setups. Both types of Series "B" Units have popular standard 5½" shut height and $2\frac{19}{32}$" die height.

How **UNIPUNCH** Hole Punching and Notching **UNITS** save time and cut costs

Unipunch Tooling System produces custom setups with standard units. Simply set up the units outside the press according to the desired hole punching and notching pattern; slide onto press bed; and start producing parts with first stroke of ram — *nothing attached to press ram.*

Unipunch self-contained Units permanently align punches and dies — *no adjustment or aligning.* These Units may be used and re-used in innumerable setups — *no "dead" unproductive storage.* Various mounting methods permit Unipunch Units to be used in presses or press brakes — *no special capital equipment required for production of parts.*

For complete information on punching and notching sheet metal, plates, angles, channels, extrusions

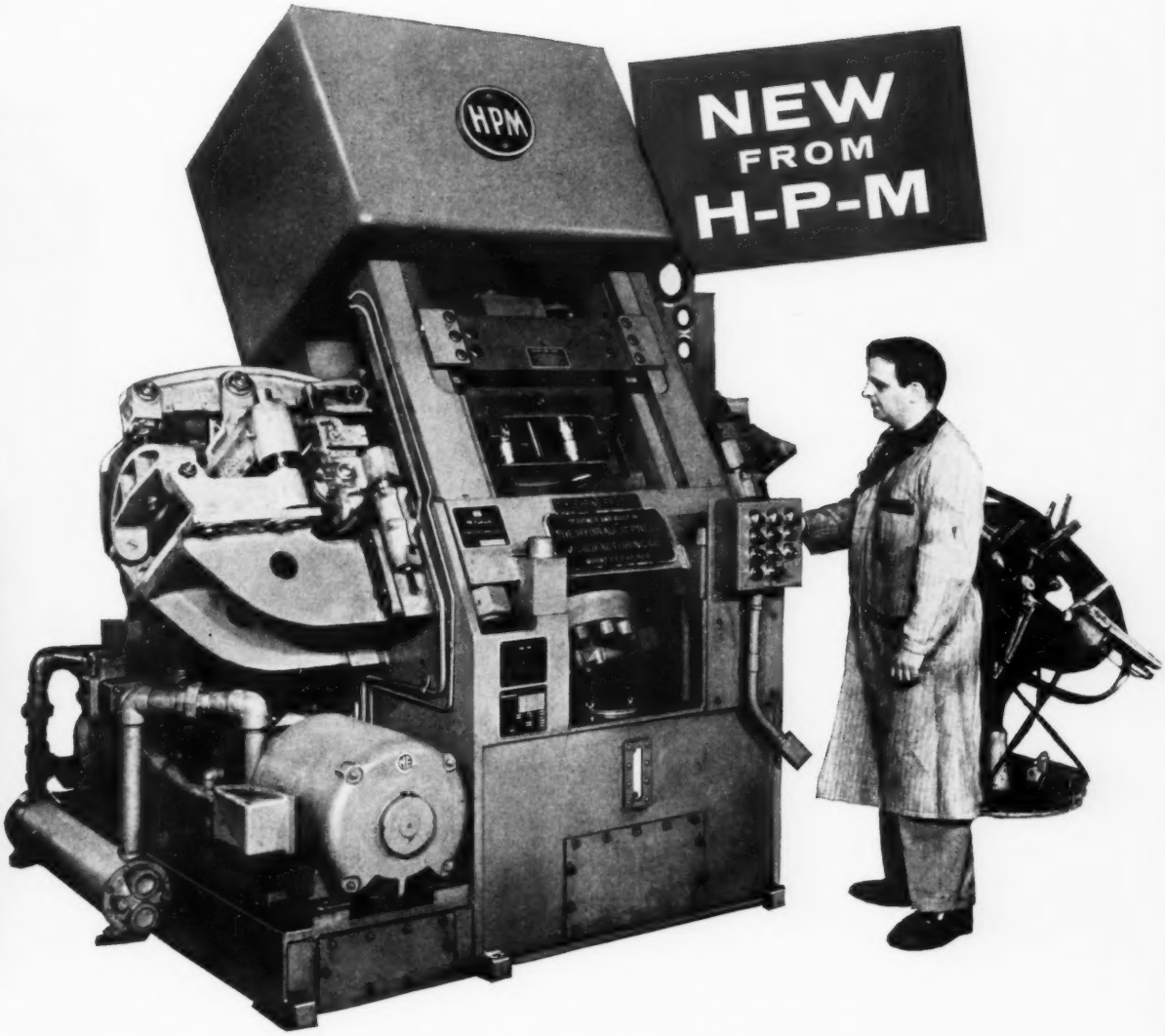
WRITE FOR CATALOGS TODAY

UNIPUNCH

CIRCLE INFORM-A-GRAM KEY NO. 42

PUNCH PRODUCTS Corp.

374 BABCOCK ST. BUFFALO 6, N.Y.



SMOOTH EDGE BLANKING

A New Cost-Cutting Process

● From mill stock to finished part with one stroke of this press. Multiply this by a hundred cycles per minute and watch the unit price of your finished parts hit a new low. It's the new H-P-M Smooth Edge Blanking Press with Special Hydrocam Dies that blanks most types of metal to close tolerances.

● This revolutionary new process eliminates grinding, deburring, shaving and straightening operations. Surface flatness and edge finishes equal grinding accuracies in most cases. And it's fast! Saves excessive capital expenditures in machines, in material handling, production time and process control.

● If you missed it at the show and need the complete facts in a hurry, write or call H-P-M or any of its sales offices.

THE HYDRAULIC PRESS MANUFACTURING COMPANY
A Division of Koehring Company • Mount Gilead, Ohio, U.S.A.

HPM

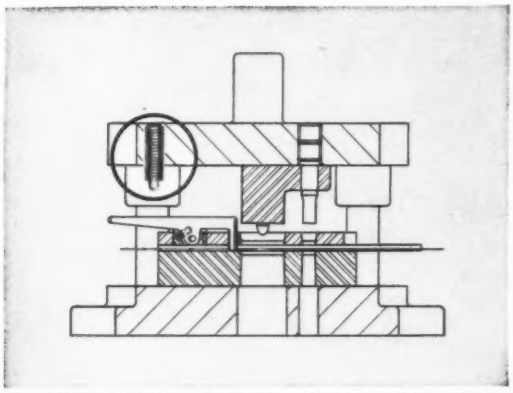
H74

CIRCLE INFORM-A-GRAM KEY NO. 43

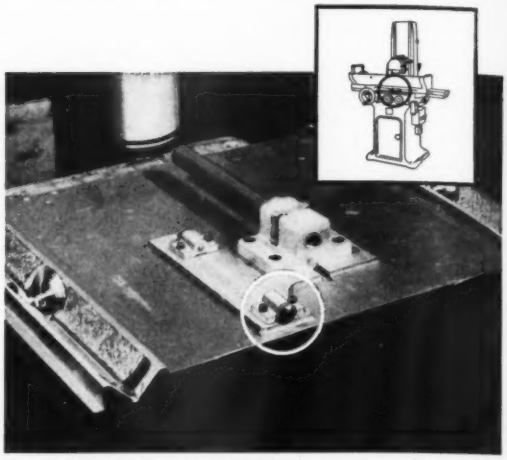
Practical Tooling Tips

Number 2 of a series.

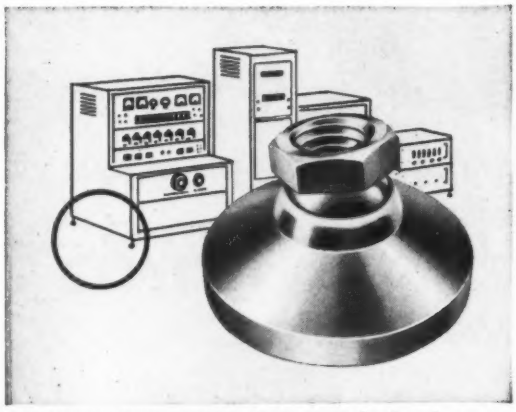
Substituting simple, off-the-shelf Vlier Tooling Accessories for complicated, custom-made devices in both tooling and original equipment applications can result in important savings. Why not put them to work in your plant?



TO STOP SMASHING DIE STOPS, substitute a Vlier Spring Plunger for the usual square-head screw. The plunger actuates the automatic stop perfectly and, unlike the screw, never needs adjusting no matter how many times the die is resharpened. Available in four models: 50 sizes.



TO CUSHION SHOCK as the bed traverses, this surface grinder manufacturer uses two Vlier Spring Stops, reducing wear and tear on the machine. These clever, spring-loaded devices, ordinarily used on fixtures where the absence of side walls prevents the use of spring plungers, are now available in three standard sizes: 3 end pressures. Special sizes made to quantity orders.



TO LEVEL MACHINE TOOLS, electronic racks, benches, etc., use the *standard* Vlier leveling pad. The pad swivels to 7½° each side of the center line; adjusts automatically to uneven surfaces. Unique ball-joint design distributes weight over entire pad surface.

TO GET NEW IDEAS on how to save with Vlier Tooling Accessories, send for new 28-page booklet "Typical Applications of Vlier Tooling Accessories." It suggests dozens of ways to use these time-savers in both tooling and original equipment applications. Write for your copy today.

New catalog now ready! Send for your copy today.

Insist on Vlier Tooling Accessories... there's still no substitute for quality!

VLIER ENGINEERING INCORPORATED

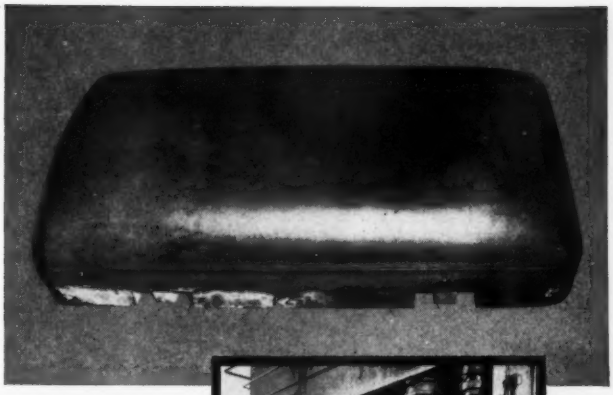
A subsidiary of Barry Controls, Inc.

8900 Santa Monica Blvd. • Los Angeles 46, California

CIRCLE INFORM-A-GRAM KEY NO. 44

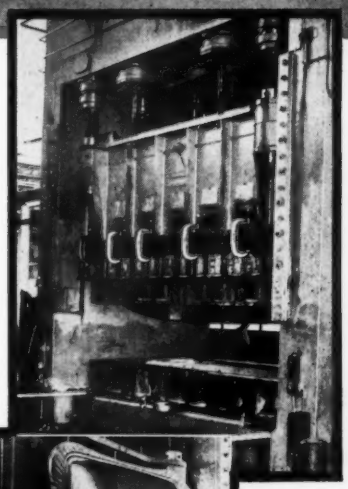
SAVED 50%!

THIS PUNCH FACED WITH REN EPOXY RESINS



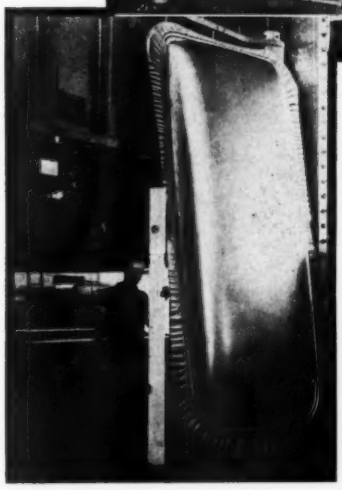
Built by Allied Products Corporation for stamping ambulance roofs, this punch is constructed of a zinc alloy core, faced with a 3/8" thickness of epoxy resin compound. The use of epoxy facing shortened tooling time—simplified the program—and reduced labor costs for an overall savings of 50%!

ON THIS TOGGLE PRESS



The punch is held in place by five large clamps on each side of this 13-ton toggle press. Stampings are drawn from 80" x 164" sheets of 18 gauge steel.

STAMPS THIS ROOF!



The roof stamping measures 68" wide, 158" long and 8" deep. Allied Products uses this epoxy tooling process to stamp approximately 4,000 roofs annually for the Miller-Meteor Company, Belfontaine, Ohio.

Reduce tooling costs at the start of the program—by selecting Ren epoxy resins for the tooling process. Engineers report programs simplified by **40%***—time saved to* **70%** *—and overall tooling costs reduced by* **50%***! Dependable epoxy formulations by Ren provide lasting dimensional stability, rugged compressive strength — plus scheduling flexibility that permits easier, quicker design modifications.*

ren

PLASTICS, INCORPORATED
Lansing 9, Michigan

ARE YOU RECEIVING YOUR FREE COPIES?

Published periodically by Ren, these bulletins provide technical information and applications of plastic tooling. If you are not presently receiving your free copies, fill-in and mail this coupon.

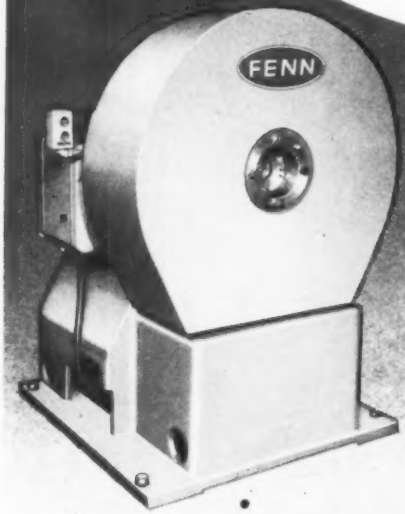
Ren Plastics, Incorporated
5422 South Cedar Street,
Lansing 9, Michigan
Gentlemen: I would like to receive
Tooling Digest

Name_____
Address_____
City_____ State_____
Company_____
Position_____
Send me more information ☐

CIRCLE INFORM-A-GRAM KEY NO. 45

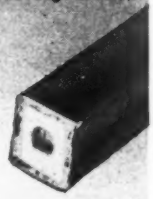
Only Fenn MAKES ALL TYPES OF SWAGING MACHINES

More and more precision metal forming operations are being performed on swaging machines because of low initial and low operating costs plus substantial savings in metals. Whether your specifications call for pointing, forming, assembling, internal reduction, or swaging squares and rectangles only Fenn offers you the model and size to exactly meet your requirements because *only Fenn makes all types of swaging machines.* Write for Fenn Swaging Catalog!

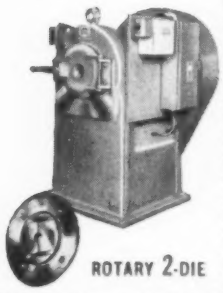


New!
STATIONARY DIE SWAGING MACHINE

Newest addition to the most complete line of swaging machines. Ideal for use where it is desirable to keep work from rotating such as in swaging square and rectangular shapes. Inherent construction provides quieter operation and minimum operator fatigue. Available in wide range of sizes.

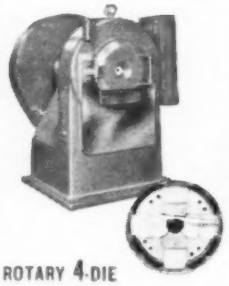


Square shaped heating element formed on Fenn Stationary Die Swager. Note round center element surrounded by compacted ceramic insulation.



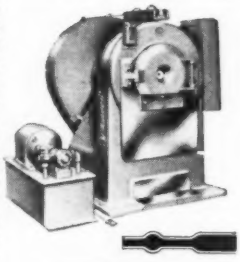
ROTARY 2-DIE

The workhorse of modern swaging machines and applicable to most swaging requirements. Low initial cost, wide range of sizes and capacities.



ROTARY 4-DIE

Ideal for swaging higher tensile materials, greater reduction per pass, and steeper angles of reduction. Also permits easy feeding.



HYDROFORMER

Equipped with special hydraulically actuated wedges that permit wide die opening. Used for internal and central reductions, and attaching fittings such as balls to cables.

FENN *Sets the Pace* **IN SWAGING**

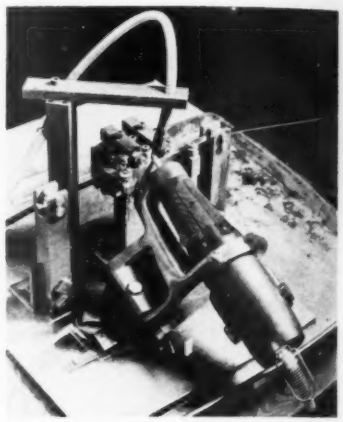
FENN MANUFACTURING COMPANY • 403 FENN ROAD • NEWINGTON, CONN.

CIRCLE INFORM-A-GRAM KEY NO. 46

Hand Grinder Used For Production Job

In manufacturing a new kitchen product, the Ludwig Manufacturing Co., Racine, Wis., was faced with the problem of grinding or milling an edge on a stainless steel strip from which cutter blades were to be formed.

Finally, Al Karls, chief engineer of an affiliate company, designed a special fixtured setup to continuously mill the strip with a ¼" carbide burr. This setup includes a pay-off reel, a strip guiding fixture, a take-up reel, and a Dumore series 40 high speed hand grinder.



A roll of strip steel is placed on the pay-off reel and fed through the grinding fixture to the take-up reel. The Dumore grinder, mounted on the guiding fixture, bevels the edge of the strip with a ¼" diamond cut solid carbide burr. The grinder is mounted rigidly on the fixture in a standard lathe mounting bracket that is available with the grinder.

Because of the high normal speed of the hand grinder and the relatively light amount of metal removed in the operation, a variable auto transformer is used to reduce the operating speed and prevent burning of the steel strip. No-load speed of the Series 40 grinder is 35,000 rpm. The transformer helps hold the operating speed to 20,000 rpm, which provides the proper surface speed for the burr. The strip feed rate is 30 ipm, which is controlled by a variable speed drive on the take-up reel. A lubricant mist is directed on the burr.

This is another in a series featuring the views of owners of leading contract tool and die companies

"NO TASK seems too difficult for this remarkable new Moore No. 3 Jig Borer"

...writes A. A. Zeise
of Tool Products Company, Minneapolis, Minnesota

"Our ability to offer the finest work on the best equipment has consistently rewarded us with gratifying success and steady growth during the past 13 years. With Moore equipment we have always been able to assure highest accuracy and top quality in our day-to-day toolroom work.

"And now, with the recent addition of our Moore No. 3 Jig Borer, we are hitting a new high in precision—constantly achieving tolerances of .000050 (50 millionths). Located in our temperature controlled room, no task seems too difficult for this remarkable Moore machine."

You, too, will easily break the "tenth" barrier—boring, drilling, reaming and spotting holes in dies, jigs, and production parts—with the new Moore No. 3 Jig Borer.

It offers more precise positioning tolerances...all hardened, ground and lapped ways...no gibs...no overhang...improved drive...and a speed range of 60 to 2250 RPM.

Write for illustrated brochure. Ask also for information on the new No. 3 Jig Grinder, which locates and grinds holes to less than a "tenth."

MOORE SPECIAL TOOL COMPANY, INC.
726 Union Avenue, Bridgeport 7, Connecticut

HOLES, CONTOURS AND SURFACES, Moore's authoritative book, tells how to produce tools, dies and precision parts the modern way. 424 pages, 495 illustrations. $5 in U. S. A., $6 elsewhere.

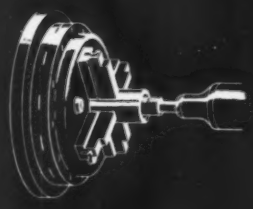
ADD MOORE TOOLS TO YOUR TOOLROOM

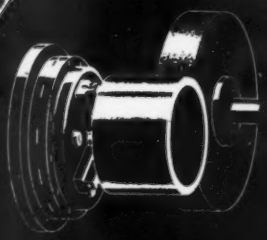
JIG BORERS • JIG GRINDERS • PANTOGRAPH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

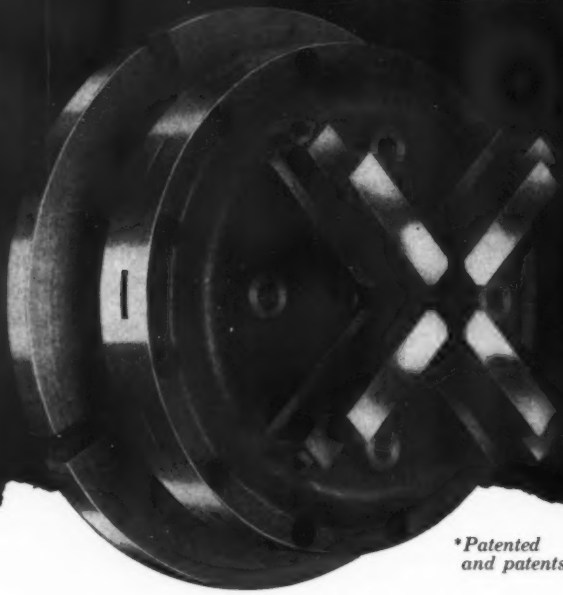
CIRCLE INFORM-A-GRAM KEY NO. 47

New ERICKSON Air Operated or Manual DIAPHRAGM CHUCKS

for utmost accuracy and concentricity







- ✓ *greater jaw rigidity*
- ✓ *internal or external chucking*
- ✓ *easy diaphragm replacement*
- ✓ *eliminates air leakage*

**Patented and patents pending.*

Basic design of new Erickson Air Operated Diaphragm Chucks* offers distinct advantages in three important areas:

Higher Production Speeds. Reduction in weight over conventional designs means lower inertial forces. Reduction in overhang reduces centrifugal forces; cleats provide sufficient counterbalance. Conventional compression-type adjustment for locating jaws gives greater jaw bearing and maximum rigidity for highest speeds.

Precision Performance. Traditional Erickson precision design and construction for utmost accuracy and concentricity.

Lower Maintenance. Diaphragm construction, with hold-down screws located on flat outer edge of diaphragm, reduces stress concentration and eliminates need for clearance holes through diaphragm for mounting bolts. Design gives higher yield point for diaphragm longevity and easier replacement. O-ring seals eliminate air leakage. Sludge slots around periphery promote escape of grinding dust and other maintenance-causing particles. AA-9506

Write for your free copy of "Erickson Air Operated Diaphragm Chuck" today.

ERICKSON TOOL COMPANY

34551-10 SOLON ROAD • SOLON, OHIO

COLLET CHUCKS • EXPANDING MANDRELS • AIR-OPERATED CHUCKS • FLOATING HOLDERS • TAP CHUCKS
AUTOMATIC INDEXING • MASTER SPACERS • DIAPHRAGM CHUCKS • PUSH-ON ARBORS • QUICK-CHANGE HOLDERS
EXPANDING COLLETS • END-CLAMPING CHUCKS • AIR CYLINDERS (allowing stock to pass through)
EXPANDING JAW MANDRELS • SPECIAL HOLDING FIXTURES

CIRCLE INFORM-A-GRAM KEY NO. 48

A New Nation of 33,000,000?

HERE IS WHAT this writer calls a hot weather editorial — meaning that it's too hot to get involved with chip making, cost cutting, or machine tool standards. It's much easier to gaze out the window and dream.

Currently, we are dreaming about a nation of some 33,000,000 population situated roughly between the Arctic and the Antarctic, and somewhere west of the Greenwich Meridian. The time is ten years from now.

Under favorable circumstances of climate, soil, mineral resources, and human enterprise, a nation of 33,000,000 people can generate an enviable, thriving economy.

It can attain a position to be reckoned with, politically, economically, scientifically, sociologically, educationally, and even militarily, in the world community.

Imagine such a nation, roughly one-fifth the size of the U.S. as having, in proportion, one-fifth of our agriculture, mining, school, plant, housing capacity, highways, and one-fifth of our growth potential for its own tomorrow. It all adds up to a most impressive picture of a good and substantial neighbor.

Now as long as we're giving our imagination a workout, we might as well get our money's worth and go whole hog.

Suppose it should come to pass that by peaceful means the U.S. should acquire, annex, or assimilate this nation.

Even more fancifully, let's ignore the land mass involved and consider this nation's people and economy plunked down within our own continental borders. (No room, you say? Read on!) Thus it could actually be a case of assimilating, rather than acquiring or annexing.

By what flight of our now sadly over-worked imagination could we hope to cope with such an eventuality? What would this friendly invasion of 33,000,000 people do to, or for, our economy?

For the answers to this question we can turn off our imagination and get down to realities. Although it won't be preceded by a modern version of the Midnight Ride of Paul Revere, the invasion is underway! 33,000,000 people will be dropping in for dinner! And we are going to have to feed them, clothe them, house them, educate them, and make jobs for them!

How come? Simply because those 33,000,000 people are the projected increase in this country's population to 1970!

Ten short years — 33,000,000 people — in itself a population greater than that of the U.S. at the time of the Civil War!

What this will do — and continue to do — to our economy, presents a challenge to our top level planners and administrators in every field of endeavor.

It would be over-simplification to say, "Oh well, you're just talking about babies and children up to ten years old." But just think of the effect those 33,000,000 new citizens will have on the status, needs, buying pattern and living standards of our present population.

Ten years means that millions of today's teen-agers will become parents. It means that millions of today's parents will become parents again and again. It means that millions of today's parents will become grandparents — all representative of different needs in consumer goods and services — a constantly expanding and changing pattern in our composite economy.

Think of these 33,000,000 new citizens and their "upgraded" elders in terms of buying power for necessities and luxuries and we find a naturally expanded economy that will take all our resourcefulness, enterprise, and ingenuity to satisfy.

When one thinks of our expanding economy in terms of cars and highways to be built, schools to be constructed and teachers to be trained and hired, cities and suburbs to be developed and re-developed, one can well wonder how all that needs doing is ever to be done — in time.

If we somehow could maintain the status quo in agricultural production what might 33,000,000 hungry souls do to our farm surpluses? And surely the toy industry faces an indisputably assured future!

Compared to the backward nations it is America's ability both to create wants and to satisfy them that assures our enviable well being. An expanding America means more wants to be satisfied.

We may not have all the answers to the problems ahead but we better start in on them! Those 33,000,000 people will soon be with us.

E. Willard Pennington

Editor

THE Exclusive SET
Featuring REMOVABLE CAP GUIDE PINS
Spouse! Do you know that Superior removable cap guide pins permit one man to part a large die set in a matter of minutes?
Sure, Sue Perior! Just the flick of a hexagon key and the punchholder virtually floats on the guide pins . . . just like we're floating here.

Exclusive REMOVABLE CAP GUIDE PINS

Now! Available on all Superior die sets in diameters from 1½" upward . . . AT NO EXTRA COST

Prevent die set smash-ups! End troublesome binding in parting dies! Always specify Superior die sets . . . with exclusive removable cap guide pins

You'll save time and money!

Write for exclusive features catalog — **today!**

SUPERIOR STEEL PRODUCTS CORP.
2754 South 19th Street • Milwaukee, Wisconsin
Cheshire, Connecticut

CIRCLE INFORM-A-GRAM KEY NO. 50

Planning the conference with the Pressed Metal Institute board are H. A. Daschner, PMI managing director; F. F. Rimmler (Volkert Stampings, Inc.) PMI president; M. A. Sherwood (Grand Haven Stamped Products Co.), PMI vice president; and the author.

What's New With The Stampers

by Carol E. Reuss

A report based on an exclusive press conference with the Board of Directors of the Pressed Metal Institute, all of whom are active in the metal stamping industry, a $5½-billion a year industry that supplies parts for almost every metal product used in homes, defense, and industry.

THE METAL STAMPING industry is one of contrasts and contradictions. What's big for one stamper is small for another; what works for ABC is impossible in XYZ's plant. Still, because the basic process is the same regardless of plant or end product, stampers have many of the same problems and achievements . . . and the same suggestions to users of stamped metal products.

Many pressworking headaches can be alleviated simply by closer cooperation with the stamping user, whether it be the outside customer of the contract shop or the intra-company user of the products of the captive shop. Stampers recommend that the die designer and the stamper (many times one and the same) be "let in on the end use of the stamped part while it is still in the print stage."

They can often suggest modifications or changes that save money — "up to 10% of the part cost, right off," said one at the PMI-T&P press conference, "because we're familiar with tolerances and limitations." At the same time, the stamper will be sure of the particular tolerances required for the job.

Speaking about customer relations, one conferee told about having shipped a part with a burr condition to a particular customer for years. The parts were never returned, even though the print said "burr free." A new foreman was hired, saw the burr free notation and ordered that they be removed. The order was shipped and the whole order was returned.

"We didn't know it," the stamper continued, "but our customer wanted the burr, once he got used to it; it helped to hold the parts together." The burr was not objectionable, regardless of what the print said. An early conference with the customer could have solved the problem once and for all.

The metal stampers have become more Quality and Quality Control conscious than ever before. Their problem at the present time is finding a reasonable method of determining Acceptable Quality Levels. Just as their stamped part shapes and sizes vary, so do the quality requirements. Therefore, tolerances should not be the same

A Potential Money-Saver:

Stacked Stampings

A pressworking technique that can replace casting, forging, and machining.

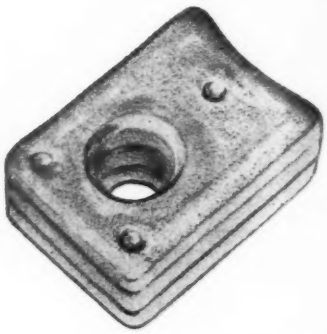


Fig. 1. A simple stacked stamping.

STACKED METAL STAMPINGS, as explained by the Pressed Metal Institute, include but often differ from ordinary stamped "laminations" — their final parts do not necessarily have symmetry of shape.

They're made by combining a variety of blank shapes, as illustrated, and often replace machined and cast or forged parts which have mass and contours, holes, or other complexities in form. Their virtues include both design flexibility and production economy.

Although the use of stacked stampings is not new to many designers, as the costs of labor, machines, machine time, tools, accessories, and maintenance continue to mount, the method should find considerably more uses.

Here, briefly, is the technique: Figure 1 shows a comparatively simple part which had been produced by machining, including drilling, and reaming, a solid plate. Stacking three stamped pieces, and reversing one to turn the burr side in, produces a part with all the features of the machined part at a substantial production savings.

There is no limit, say those who have used stacked stampings, to the number of parts now being cast, forged, or otherwise produced by more expensive machining, that could lend themselves to design and manufacture by stacking stampings.

The part in Figure 2 was

throughout industry, nor should the inspection requirements be the same. The Pressed Metal Institute is currently studying the situation, trying to evolve a workable pattern for its members to follow.

The trend toward closer tolerances and smoother finishes has posed another question for the individual stamper: Does he want to install tumbling and barrel finishing equipment? Eastern stampers, many of whom concentrate on production of small parts, have taken the lead, it seems, in equipping their plants with this type of equipment. As long as their customers want and are willing to pay for the added operations, the stampers are satisfied as to the need for it.

Uniform Stock a Must

Talk of Quality, when speaking with metal stampers, naturally gravitates to the stock — to the mill supplier. They complain to the mill suppliers regularly that sheet and coil stock isn't consistently uniform, and when the situation gets serious enough, they change suppliers. They often make the circuit of mill suppliers, they admit, only to end up with the original one. "When his promises go sour, we make the circuit again," they say.

The mills can and should control thickness tolerances more closely, the stampers believe, without charging extra. This uniformity is particularly important to stampers who use progressive dies.

(As this article was being prepared, Airborne Instruments Laboratory, a division of Cutler-Hammer, Inc., announced first installation of a system that automatically accumulates, records, and prints deviations in the quality of tinplate as the coil passes the inspection station. The purchaser gets the inspection record with the coil so he knows where the defects are and can more readily cut out sections not up to his standards. While this system leaves the scrap removal to the user, it is a step toward closer quality stock for the user.)

Very few stampers represented at the PMI press conference are using foreign steel, mainly because "it's not dependable." Interestingly enough, though many complain about U. S. steel they're emphatic about not wanting to use foreign steel.

Few foreign presses are being used in PMI member plants. "They aren't built to withstand the long production runs prevalent in this country," one answered. "It takes months to get repair parts," said another who'd experienced this situation. Perhaps this is unconsciously a "Buy American" move — whatever the case, it is almost universal among the executives at the conference.

Talk of foreign steel and foreign machine tools naturally leads to the question of foreign competition. Some contract stampers feel the competition from their overseas counterparts; enough to make one carefully explain that "every

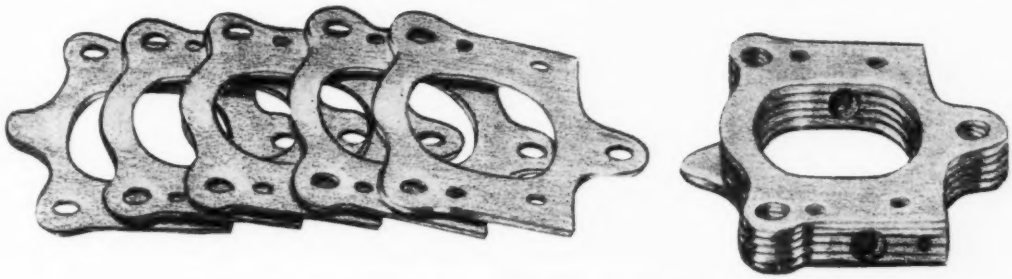


Fig. 2. Five stampings form a control valve which was formerly cast.

formerly cast, and required extensive machining. It's an automobile body heat control valve and is now made from five similar stampings, held to size dimension-wise, interlocked by semi-pierced holes, hydrogen brazed, and then cross-drilled, as shown.

There are many ways to "unitize" the stamped layers. Pinning is the most common method: Pinning holes are provided when the blanks are designed. Pins are merely inserted and secured in the stacked assembly.

Brazing is another assembly method used, as is dimpling, whereby semi-pierced holes or "dimples" are designed into all layers. After the parts are assembled, pressure on the stack secures them.

Welding is also used to assemble parts made of stacked stampings. The blank for welded stacks is designed with a notched edge to provide an area where a weld can be laid. Unless the applications call for the weld to be smoothed flush with the side of the stack, often the weld need not be ground.

There is no one preferred method, however, for securing the stacks of stampings. Once metal adhesive manufacturers look into the process perhaps they'll offer a "glue" for the job. Size, shape, material, and part application are all evaluated in considering the bonding method.

pot and pan imported from Italy is reason for U. S. stampers to go out and look for new sales possibilities here." "Every dollar's worth of simple washers imported from Germany," said another, "means my shop has to look around for those dollar's worth of business."

While the situation has not reached a crisis stage, it points up the fact that U. S. manufacturers have to keep aware of production improvements to stay competitive, and to keep looking for new fields to enter. The examples of stacked stampings illustrated on these pages are an attempt to get more business into the stamping plants and to make parts more economically at the same time.

European methods of making and using quick-change dies and circular presses were on recent agendas of PMI Technical Conferences. Those who've investigated them more completely say neither will find wide-spread use, as is, in this country. Next summer, many of the members will tour European plants. Their views after examining these techniques more closely will make good reading.

Developing Design Talent

A serious non-production problem for the stampers is that of getting and/or training good die designers. The colleges and universities, they complain, are "too high-brow," too academic. Engineering graduates, the stampers believe, need more practical training or experience. They should learn more about the operation, virtues, and limitations of the basic machine tools for which they will be designing.

One company has been ignoring college-trained engineers when looking for designers. Instead, they spot likely die designers in their tool and die apprenticeship classes. These men continue company-sponsored training upon completion of the normal apprenticeship. "By the time they have learned what they can about making tools and dies," the company's spokesman said, "they can more efficiently and ingeniously take on the advanced die design work." Companies without tool and die apprenticeship programs, of course, cannot undertake such a program.

A danger from this type of program is the temptation for designer graduates to leave the firm for greener pastures. Good employee relations, although not specifically mentioned, are vital.

Design talent isn't the only concern of the stampers. All-around management trainees for this special industry, are a problem. So much so, in fact, that a whole session of next month's PMI annual meeting at Shawnee-on-the-Delaware will be devoted to "Training Management Replacements."

A good number of the contract stamping plants started out as one-man operations. Many are in the hands of second-and-third-generation managements. Now, however, the bosses think not of working the rest of their lives in their

plants, but of working now and enjoying retirement later on. Therefore, they must think ahead to what will become of their companies. They are hunting for versatile, smart, ingenious young men who can take over the varied tasks and keep the companies profitable.

Die Storage

Die maintenance and storage techniques were broached by one of the press conferees. He had seen a newer plant where the dies were lined up like soldiers in a special die storage room. The last acceptable part was anchored to each one; the dies were ready for immediate use.

This neatness saves time and trouble when a die is needed for a repeat order. It comes partially as a result of good customer relations. When the stamper or stamping department is in the enviable position of knowing fairly accurately if a re-order will be forthcoming, the dies can be sharpened and repaired before storage.

Plants which repair dies only when an order is received, on the other hand, don't usually have the die ready for immediate use.

This portion of the total stamping picture, like many others, depends on a number of things: the press, the parts, the die, the customer. More modern plants, however, are organizing die storage areas and die maintenance programs.

Plastic tooling is being used by many of the stampers for forming and for checking operations. For the mass production work most of them concentrate, however, on tool steel and carbide dies. Cast-to-shape dies and nickel-coated-plastic-filled dies are still in the "consideration" stage for most of them.

Steel rule dies, which witnessed a revival during the past few years, are being used for limited applications, too. A New York firm has been licensing others to make steel rule dies, and in answer to questions about how this can be done came the explanation that the method itself is not new nor license-able. The New York company only licenses their particular method for mounting the steel rule die. No one at the conference would commit himself as to whether or not his plant is using "old" or "new" mounting methods.

What about explosive forming? All agree that explosive forming has a very limited application and stampers in general won't be affected by it.

What are stampers doing in the pressroom to cut costs? They are using pick-outs, pull-outs, blow-outs, and a whole list of press accessories to move blanks and stamped pieces along more easily and quickly.

"Build automation such as this into the equipment," was the opinion of one.

"Build it into the die," chimed in another, who explained that the use of progressive dies is a money saver, particularly in long runs.

A third settled the whole question with: "Savings in material and die life because of automated presses, pressroom equipment, and dies, will save stampers and their customers money."

Efficient Work Flow

Another area for cost cutting or cost controlling is that of die and materials handling. "Getting the stuff moved around in the plant and using the least amount of non-productive labor is the way we save money," said one. For dies that aren't too large, lift trucks are used to hoist the dies to the press beds. Others work off hydraulic tables.

Some stampers change press line-up as often as they change dies; some don't. The plants with smaller presses (25 tonners) don't think anything of moving whole batteries of presses to get more efficient flow of work. "If we have a battery which should normally run together," said one, "and fit together, and it looks like the run is long enough, we'll come in with a lift truck and move them."

Inter-plant transportation costs enter more into the stamping business now than ever before, particularly when dealing with the automobile industry, said the stampers. Buyers of stampings look for the lowest piece price plus transportation costs to various assembly plants before they let a contract. This is tending to regionalize much of the stamping business, as well as the tool and die making that goes with stamping.

Sliding bolster presses, at the present, are limited to automobile body and similar large operations. Where the die-change time can be cut appreciably by mounting dies outside the press and sliding them in, they're worthwhile, agreed the conferees.

More important to the majority of stamping plants are variable speed presses. They want the added versatility that variable speed presses offer, even though this adds to the original cost of the equipment. A wish is an accurate, simple, lowcost load indicator on their presses.

Press Replacement

Speaking of presses, and press replacement, the metal stampers, particularly those in the many contract shops, are definitely not "paperwork oriented." They don't like to work out replacement formulas and things of that sort. In commenting on press replacement at least a third of the companies represented at the press conference indicated they had bought new presses within the last few years. Those same people, plus others, said too that they had no planned replacement programs. They rely on their own experience and a good bit of rule of thumb calculating, chancing a purchase when they think they need added press capacity.

When they do replace presses and related equipment they almost unanimously agree that they tell the equipment builder what they need and listen for the seller's recommendations. "From the standpoint of maintenance over a period of years," one commented, "and the fact that we are using the presses constantly, we should listen to the press builders because they certainly know their business." What greater testimonial could be given?

Extra copies of this article are available while supply lasts. Write Tooling & Production Magazine, 1975 Lee Road, Cleveland 18.

Precision Dies . . . . Precision Stampings . . . .

for Savage Sports Rifles

by E. Willard Pennington
Editor

PRECISION PROGRESSIVE DIES are a must when it comes to volume production of accurate and interchangeable parts for sporting rifles. Particularly is this true when, traditionally, such parts have been machined from the solid.

Another deterrent to the use of stampings in guns has been the raised eyebrows at the idea of substituting stampings for machined components. In this case however, the transition has been 100% effective and entirely painless.

The parts shown here are press-produced in precision progressive dies. All of the punches and dies are designed and manufactured, and production tested, for Savage Arms Corporation, Westfield, Mass., by H. E. Dickerman Mfg. Co., Springfield, Mass. They are specialists in the design of high precision stampings for the sporting gun industry.

Figure 1 is an array of Savage Arms parts identified as to "part number" and, for you gun fanciers, showing "part name" and "caliber." It is noteworthy that the parts designs are destined to serve, in four instances, all calibers; while in the case of part #8, the

Figure 1.

Part No.	Name (Model 110)	Caliber
1	Magazine Box	30.06
2	Trigger Bracket	All
3	Floor Plate	30.06
3a	Floor Plate Insert	30.06
4	Sear	All
5	Floor Plate	.270
5a	Floor Plate Insert	.270
6	Magazine Follower	30.06
7	Magazine Follower	.308
8	Magazine Spring	30.06 and .270
9	Magazine Hatch	All
10	Ejector	All

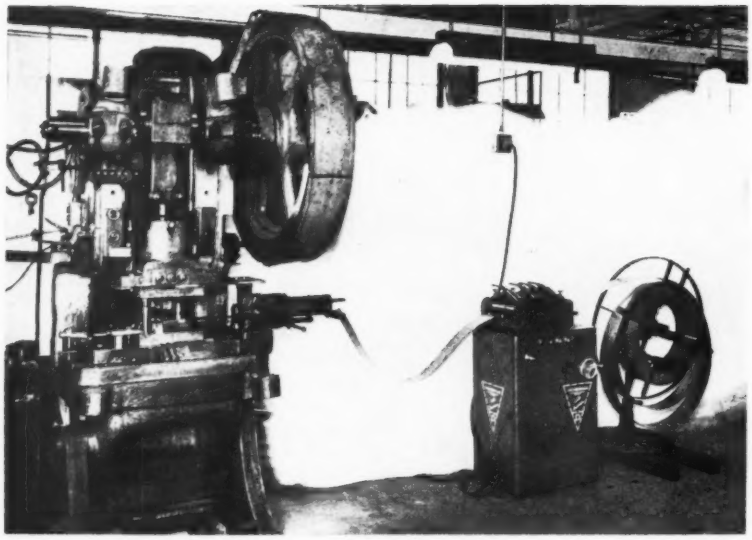


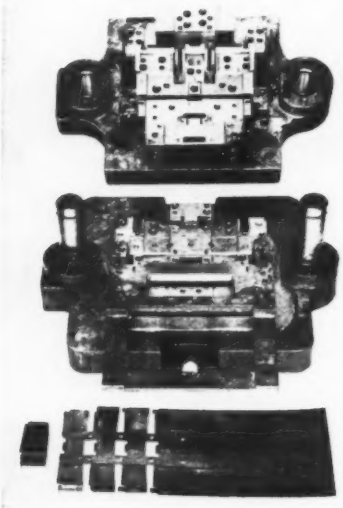
Fig. 2. Dickerman stock reel, stock straightener, and Rol-Di-Feed, and tryout press as lined up for producing part #2, Figure 1.

same magazine spring functions in both the 30.06 and .270 caliber guns. The other parts serve, as noted, just the one caliber listed.

The parts in Figure 1 emphasize the importance of the utmost rapport so essential between die builder and user/customer. In several instances interchangeability (as between calibers) has been accomplished. In another, the production of two slightly dissimilar parts from the same die simply involves the addition (or removal) of one punch.

These represent economies in production and cost reduction of parts and/or final product which occur when the die designer is afforded the opportunity to visualize the over-all and complete requirements.

Fig. 3. Progressive die and development strip for part #1, Figure 1.



In this connection Dickerman feels that they gain by operating in a slightly unconventional manner. They keep "try" guns on hand (you should see the cases of guns in their front office! We drooled too!) to use in developing parts for a new gun. They are simply told what the part must do, where it must fit, and they take it from there.

Dickerman admits that this may seem slightly unorthodox. To operate in this manner, however, involves a full "package" of die-making skills and it is not necessary, in most cases, for the customer to supply them with completed die drawings.

Confidence must be earned, of course, and until the customer has implicit confidence in the die designer, and freely and readily places himself in the designer's hands, does it become possible to design combination dies which offer a potential saving of many thousands of dollars in tooling charges.

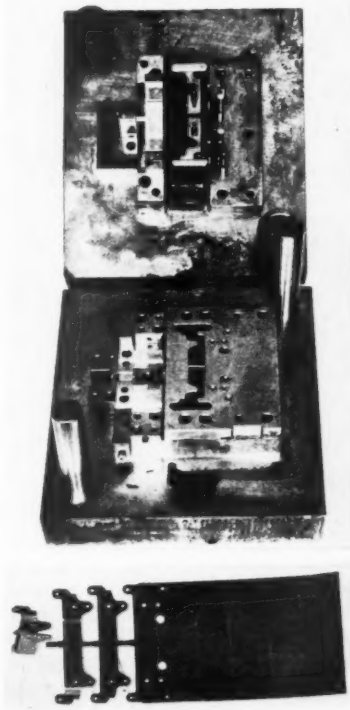
Figure 2 shows a typical press and progressive die setup for running part #2, (see Fig. 1) during die tryout. As in production, the press is augmented by a Dickerman Stock Reel and Stock Straightener. In this case a 9" Dickerman Rol-Di-Feed is used for feeding the strip to the die. The feed is mounted as a press accessory by means of a Dickerman Feed Mounting Adapter. This provides adjustment — up, down, and to either side — to attain alignment of the stock travel with the die and stripper.

Referring again to Figure 1, part #1 (magazine box) is produced in the seven-station die shown in Figure 3. The first station does an embossing operation, and two pilot holes are pierced at the second station.

The third station is a pick-up station where slots are also pierced, and the top and bottom of the magazine box are trimmed, except the section where pilot holes are located.

At the fourth station the taper shape of the box form is produced, and in the fifth station the three tabs are formed at right angles, as are the extreme ends in the sixth station. At the last, or seventh

Fig. 4. This die produces the trigger bracket which is interchangeable for all calibers.



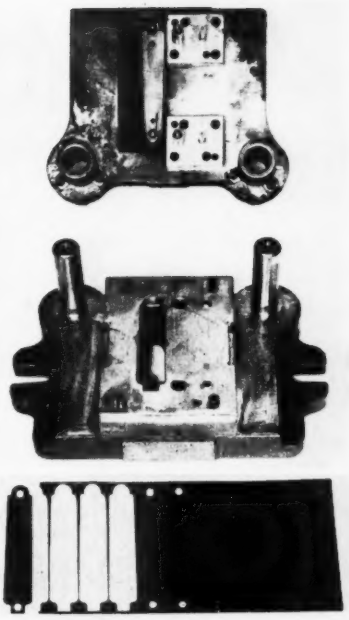
station, the cutoff operation takes place.

The final U-ing is done in another form die which is designed so as to be interchangeable for use with magazine boxes of other calibers.

The trigger bracket, part #2, (Fig. 1), is produced by the die shown in Figure 4, and is interchangeable for all calibers. The two views of Figure 4 show the die's stations and strip progression.

Piercing holes and trimming the contour of the front and back sides occur in the first station. The second is a pickup station for piloting. In the third station, the reverse double offsets are formed. The fourth station cuts off part of connecting tab and imparts a right angle bend to the rest of the tab. In the same operation the bracket is given its U-shape.

Fig. 5. The stamped floor plate, parts #3 and #5, Figure 1, produced by this three-station die replaces an expensive die casting.

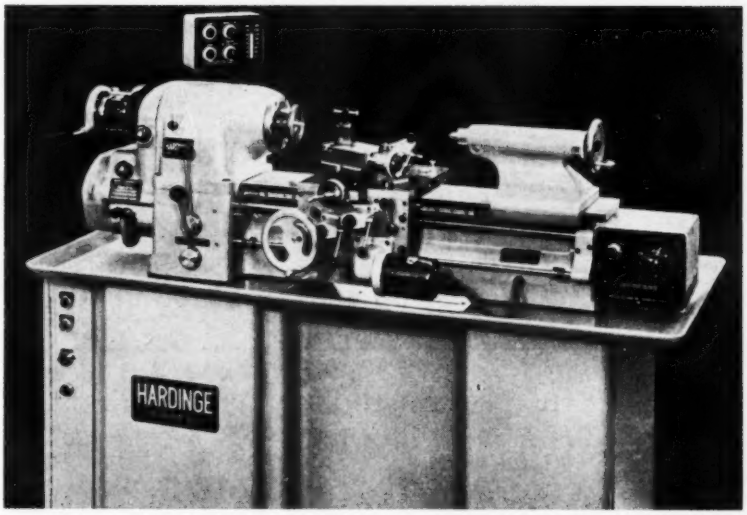


The floor plates, parts #3 and #5, (Fig. 1) are made in dies similar to that shown in Figure 5. As evidenced by the progressive strip, the pilot holes are pierced in the first station, while the second station picks up and countersinks the holes for woodscrews. The final blanking takes place in the third station which also gives the blank a special contour to fit walnut gunstock.

This part requires no subsequent machining operations and replaces an expensive die casting.

Extra copies of this article are available while supply lasts. Write Tooling & Production Magazine, 1975 Lee Road, Cleveland 18.

Toolroom Lathe For Accurate Threading



The new high speed precision lathe, Model HLV-H, has an 11″ swing over the bed and infinitely variable speeds from 125 to 3000 rpm with pushbutton control. It has an electrically actuated variable speed drive.

Built-in automatic thread length control and a quick-acting compound slide for threading are standard on the machine made by Hardinge Brothers, Inc., Elmira, N.Y. A separate motor provides the feed for the carriage and cross slide enabling the lead screw to be used for threading only. Feed rates are easily changed by turning a knob on the control box at the right hand end of the bed.

The large headstock frame and large precision preloaded ball bearings provide maximum precision for sustained operation at full speed. The headstock spindle has a through collet capacity of 1-1/16″, and step chuck capacity of 6″. An electrical interlock prevents starting of the main drive motor when the spindle lock pin is engaged. The headstock drive belt can be changed without removing or disturbing the high precision bearing or spindle.

Coming next month:

"How Would You Outfit An Ideal Machine Shop?"

"Standard Machines Team Up For Production"

An Editor Interprets (TP)

Part I

by William E. Hoffman
Managing Editor

What TP (True Position) does:

Allows interchangeability without use of small tolerances
Provides more area for location of hole center
Speeds determination of tolerances
Simplifies tolerances of complex parts
Overcomes accumulation of tolerances
Gives more adequate location
Interprets tolerances for both production and inspection
Permits use of easily made gages that simulate mating part
Reduces scrap caused by other tolerancing methods

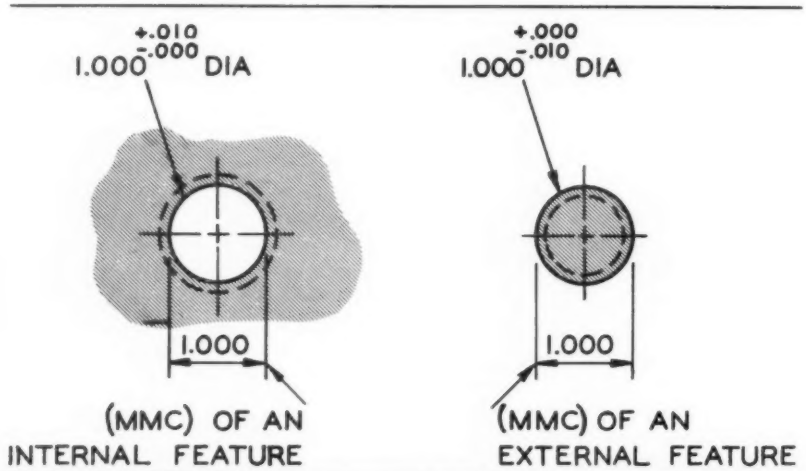


Fig. 1. Maximum Material Condition (MMC) exists when a hole or other internal feature is located at its low limit and when an external feature is located at its high limit.

Part II will appear in the November issue of Tooling & Production

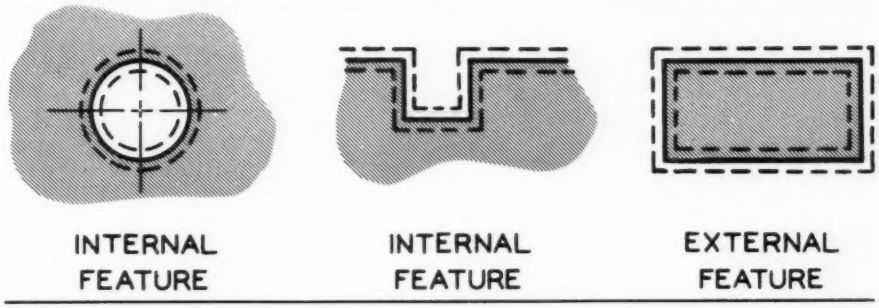
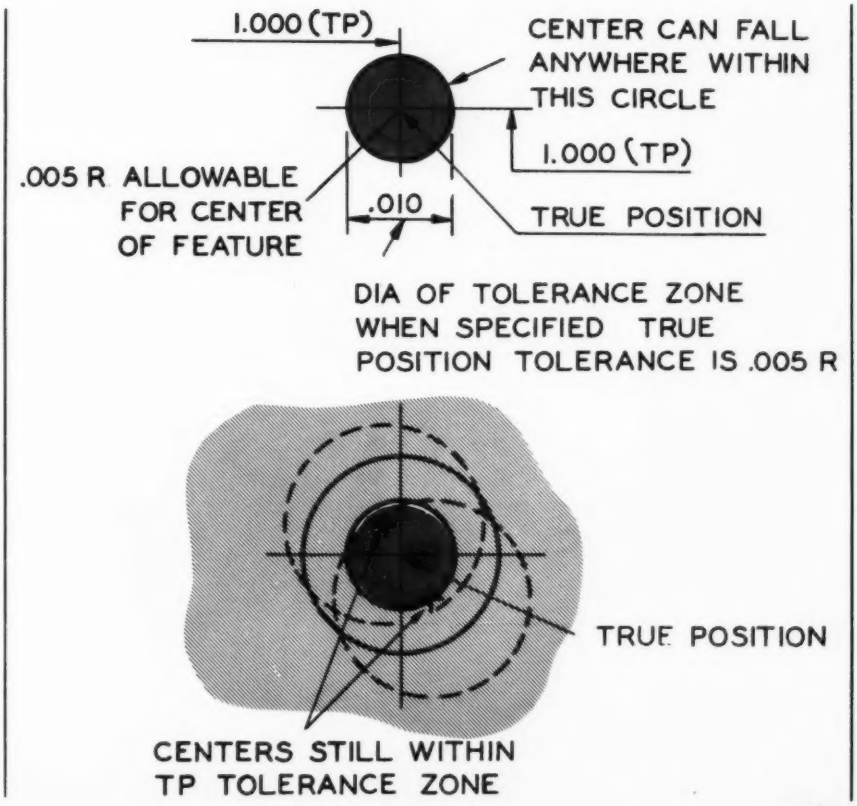


Fig. 2. TP tolerancing is readily applied to these three types of features. The solid line of each feature shows its basic size while the broken lines establish the upper

Fig. 3. The center of a feature can fall anywhere within the true position tolerance zone defined by colored circle whose center is at true position. Circle radius is equal to the TP tolerance. Upper view of drawing shows colored tolerance zone; lower view shows two permissible location variations of hole (broken lines). Solid line, in lower view, shows same hole with its center at exact true position. In theory this never takes place.


1.000 (TP)
CENTER CAN FALL ANYWHERE WITHIN THIS CIRCLE
1.000 (TP)
.005 R ALLOWABLE FOR CENTER OF FEATURE
.010
TRUE POSITION
DIA OF TOLERANCE ZONE WHEN SPECIFIED TRUE POSITION TOLERANCE IS .005 R
TRUE POSITION
CENTERS STILL WITHIN TP TOLERANCE ZONE

. . . continued on page 62

Erector-Set Draw Dies Are Timesavers

Fig. 1. Parts drawn on adjustable die set. Stamping on right was produced at Machine Tool Exposition demonstration.

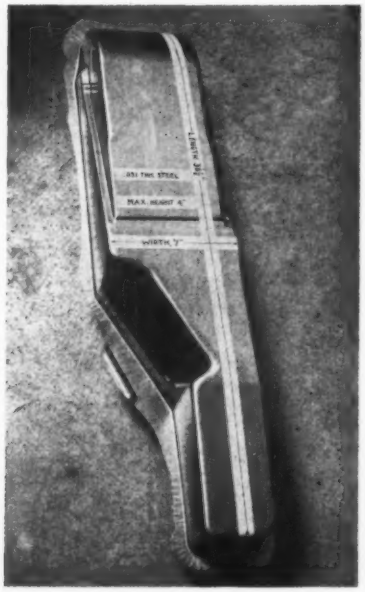
VISITORS AT LAST MONTH'S Machine Tool Exposition saw the erector-set principle taken out of the hands of juvenile tinkerers and applied to the realm of deep drawing. An adjustable draw die, constructed according to the erector-set idea was demonstrated at the show on a large Niagara press. The versatile die set produced a 28″ long part (Fig. 1. right), one of a wide variety that can be drawn with the same set by simply adjusting the die members.

The set consists of hold-down and die ring support sections locked in between two long rails attached to a slotted die shoe (Figs. 3, 4). A pair of gibs guides the hold-down and keeps the pressure plate aligned so that accurate gaging can be mounted on it to control the uniformity of the flanges.

By changing their location on the rails, the hold-down and die ring support members can be expanded in width and length to properly support the various parts to be drawn (Fig. 2). Parts up to 19″ x 40″ can be drawn on the die shown, and larger dies can be made to suit most size stampings.

With the adjustable die sets, prototype stampings can be made in days instead of weeks and the engineering involved is reduced to hours instead of days. S. B. Whistler & Sons, Inc., the Buffalo, N.Y. firm that designs and builds the dies, has used them to make a variety of prototype parts for many firms. end

Fig. 2. Large part formed on adjustable deep drawing dies is one of a variety that can be made on the same die set.



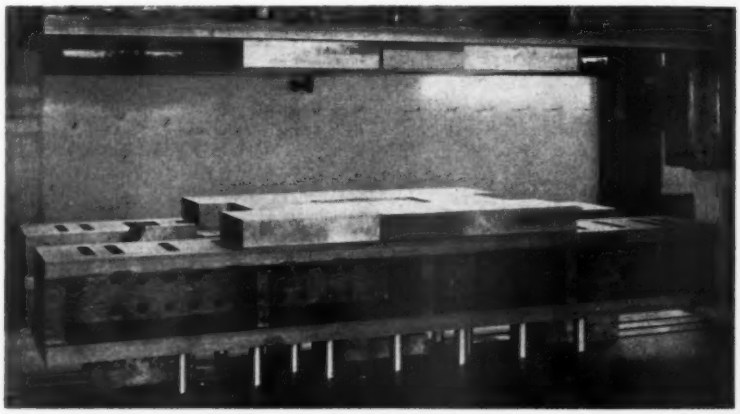


Fig. 3. Bottom set of side rails with attached support sections is in raised position ready to accept a blank. The die ring and hold-down support members can be moved to different locations on the rails for drawing of larger parts.

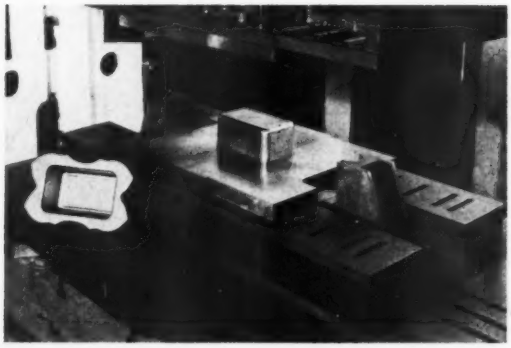


Fig. 4. Punch used in drawing of part on left is exposed after bottom section of die is forced down by upper portion of the die attached to the press ram. Pair of gibs keeps pressure plate aligned.

From the Cover:

Vinyl Clad Steel No Problem

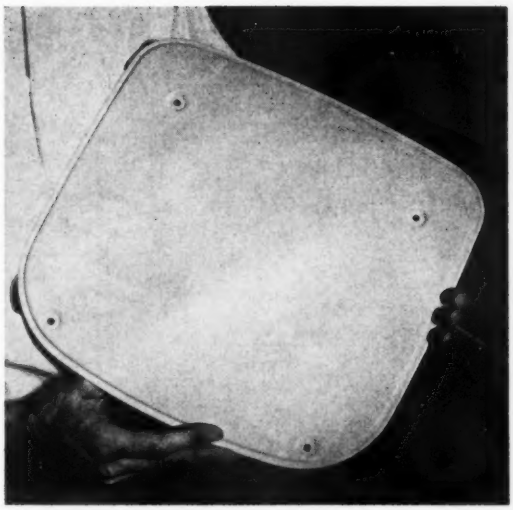


Fig. 1. Irwin Seating's vinyl coated steel chair seat after it has been trimmed and punched. Cuts are clean, without deforming the embossed vinyl pattern or causing the plastic to peel. The plastic is mill coated on steel sheets by U.S. Steel.

VINYL COATED STEEL can be fabricated with minimum stamping adjustments, both for drawing and trimming. So says William W. Irwin, president of Irwin Seating Company, Grand Rapids maker of school and institutional desk and seating equipment, who's been using the material to give the Company's products "a new dimension of color, warmth, and texture."

The plastic on steel is a development of U. S. Steel Corporation involving curing and bonding of liquid vinyl plastisols to sheets and coils — either cold rolled or galvanized in a continuous mill coating process.

Irwin Seating uses 18 ga, 36″ x 105″ vinyl coated steel sheets. These are sheared to square blanks of a size sufficient to make seats and backs of its school chairs. They report "virtually no scrap loss."

The firm uses the same kind of die sets and equipment for the vinyl steel as for plain steel sheets, with a minimum amount of ram adjustment. A small amount of drawing compound, which is removed by a wax paste just before the seating unit is assembled, is also used.

Fabrication of the school chairs involves two stamping operations. The first (see cover) is to shape both the seats and backs in one press stroke. By drawing both chair parts in one stroke, inventory problems are lessened — the runs are always equal. A second operation trims and punches the parts. An "indestructible" trim is added before the pieces are cleaned and fastened to the formed steel tubing which makes up the frames.

Fig. 3. Finished chairs for budding classrooms. The vinyl coated steel backs and seats are riveted to shaped steel tubing.

Fig. 2. The finishing touches on a vinyl coated steel chair back include pressing (planishing) a firmly locked trim that can't pull off.

So far Irwin Seating has had good success with the vinyl-steel. It is readily drawable and the textured plastic surface cleans up easily. A report shows that only 0.007% of their last run had minute flaws. They use a textured beige and a mist green vinyl coating, which blend with most classroom decor. end

. . . True Position, from page 59

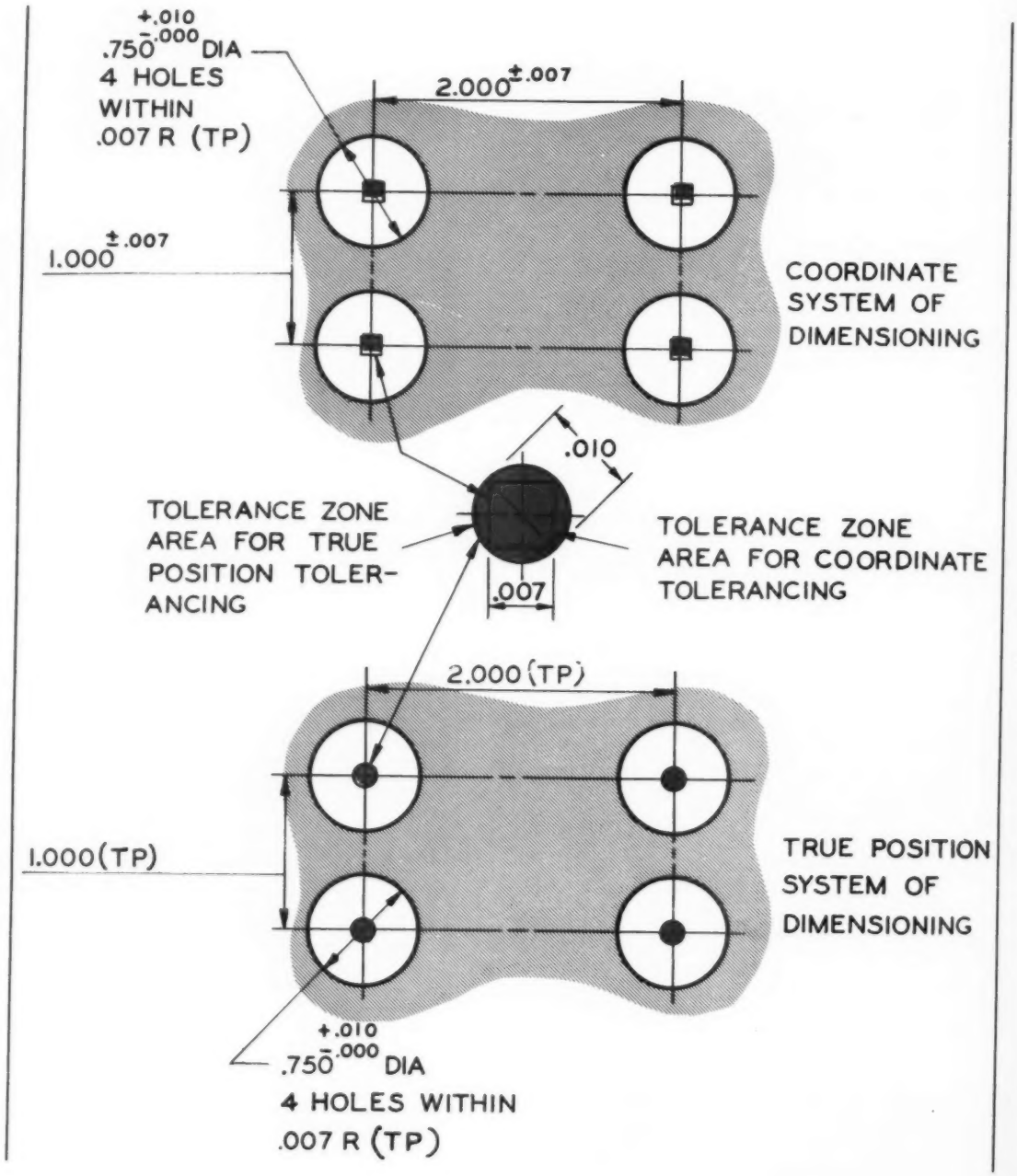


Fig. 4. Here the locations and sizes of four holes are specified, although size considerations are not interpreted here. The top method shows the coordinate system, while below the simpler (TP) method is employed. The tolerance areas of the two systems are superimposed and enlarged to show the additional tolerance area advantage of the TP system.

Fig. 5. Hole is at (MMC) when it is at its low limit. If it is to be located within 0.005R (TP), the tolerance zone of the hole center will have a 0.005R (top view). However, if the high limit of the hole is considered, its center could fall within a larger area. If the hole tolerance is designated as +.010 to −.000, the additional tolerance area increase would be 0.010 on the dia (bottom view).

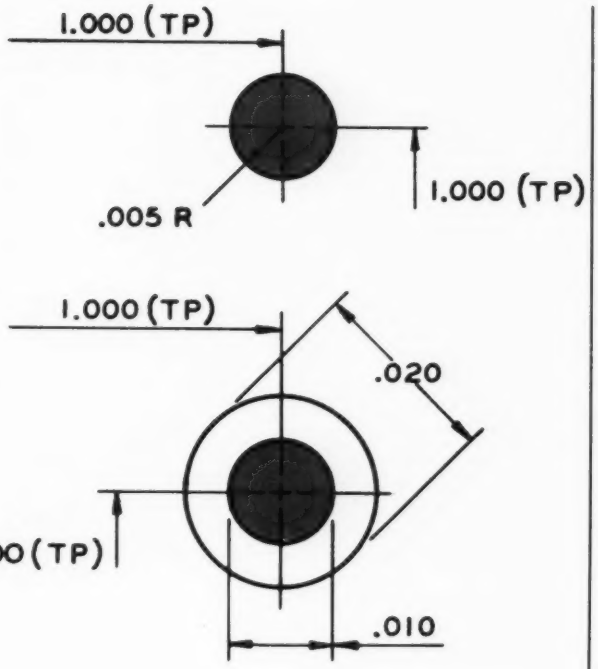
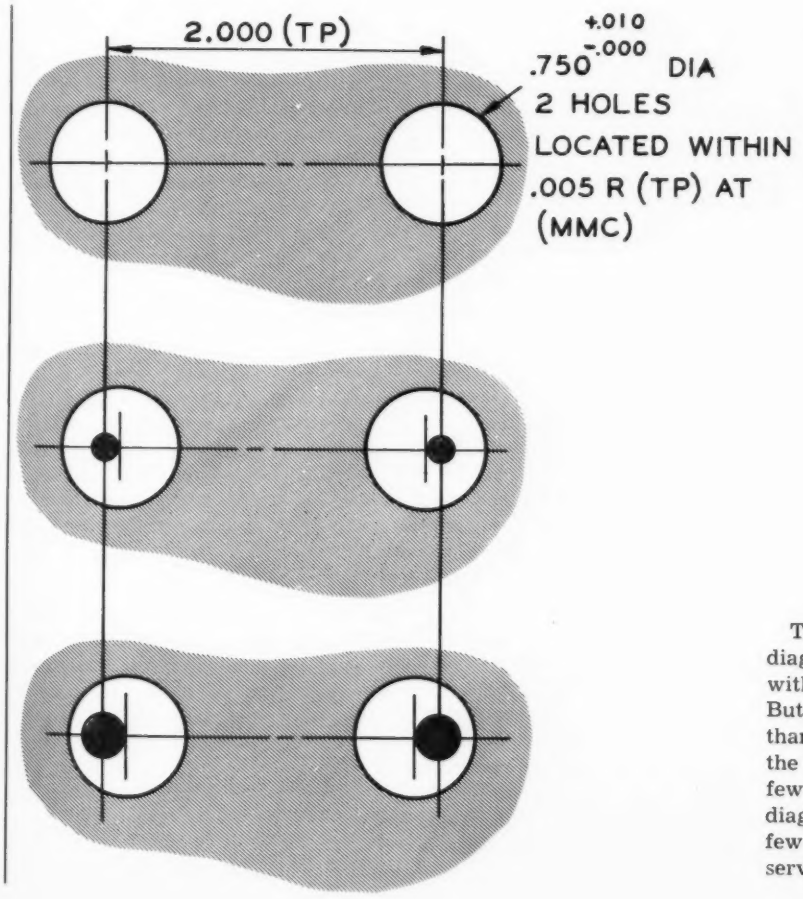
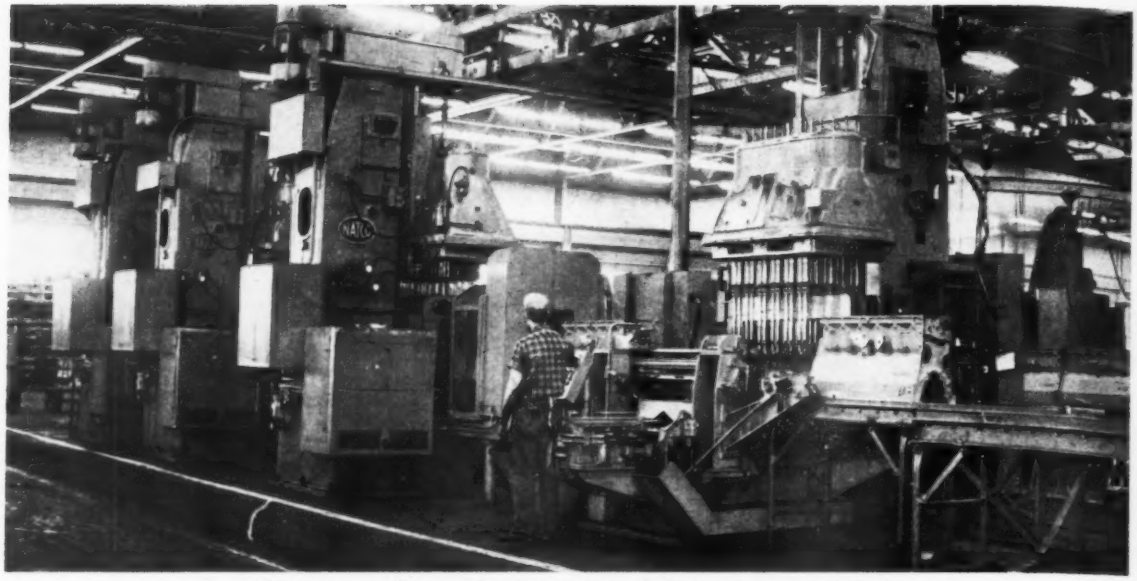


Fig. 6. Allowable deviation of hole center location. Top view shows part with hole specification. Middle view of same part shows center deviation due to TP tolerance. At bottom, same part is shown with center deviation due to TP tolerance and additional allowed deviation due to hole size tolerance.



There are any number of other diagrams that could be included with these for reader "studyout." But sometimes too little is better than too much. Also, we thought the reader might want to make a few sketches of his own. With the diagrams supplied, as guidance, a few self-made diagrams might serve to fix the principles in mind.

end



Natco convertible transfer line consists of three two-way machines and one vertical multiple-spindle drilling machine. Two rollover transfers are included in the line.

Convertible Transfer Line For 'Medium Production'

Conventional machine tools are tied together into a "transfer machine" that has the production potential of single-purpose equipment and the changeover versatility of general-purpose machines at Caterpillar Tractor Co., Peoria. Engineers there worked out the line with National Automatic Tool Company.

The new Caterpillar line machines four- and six-cylinder diesel engine blocks for their D-4 and D-6 "Cats." It includes some 30 separate machines, tied together with conventional transfer equipment. All but the "Cat-type" deep hole drilling and reaming machines built by Caterpillar are conventional machines. Even the Natcos which form part of the line are conventional, but their use isn't.

The Natco machines are tied together into a "convertible transfer line," performing what Caterpillar describes as "progressive production."

The line consists of four standard Natco multiple spindle drilling machines — three two-way machines with horizontal and vertical drilling heads, and one vertical machine. The first two perform drilling operations, the third both drilling and tapping, and the last tapping only.

Each machine has its own control panel, so the operator has the option of operating the machines singly or as a four-machine unit. Since each machine is self-contained, any one can be removed from the group and operated independently for other production work. When a machine is removed it can be replaced by a conveyor link or another machine.

What this means in terms of production versatility is easy to visualize. If Caterpillar is running six-cylinder blocks and wants to shift over to the four-cylinder version, drill hole patterns can be changed with the loss of only part of a shift. A modification in the hole pattern merely calls for new slip plate inserts, or reboring of the old ones in a matter of hours.

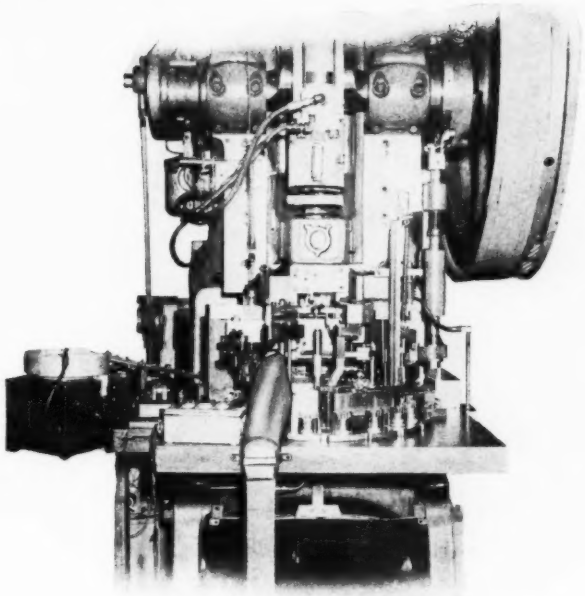
The Natco convertible transfer line is not a high volume "mass production" system in the usual sense. Neither is it a low volume "job lot" system. Its function lies somewhere between, in an area which Natco calls "medium production," and which covers a spectrum of manufacturing in which much improvement in productivity is not only possible but imperative.

Linking the four Natcos together cost only about 12% more than the individual machines. Most of the added cost was in transfer equipment. Two of the Natcos were even used as individual machines before they were linked together.

Caterpillar feels that the entire D-4 and D-6 engine line has enough versatility and expansion potential to accommodate 10 yrs of production.

end

Here's How . . .



This dial-equipped press replaced 13 other presses at the same time it increased production by 2000%. The unit, in combination with another press, produces 20,000 clamps for wood folding rules in a 7½ hr day.

Dial Feeds Can Boost Your Press Production

by William W. Schug

Mr. Schug is with the Hudson Division of Emhart Manufacturing Company of Hudson, New York.

Dial feeds, recognized for more than 60 years as one of the most valuable press attachments, are now coming into their own as self-contained production units.

ALTHOUGH THE NUMBER of applications in which the dial feed serves as a complete production unit is still limited, this concept of divorcing press and feed is gaining favor. For example, the modern notching machine is actually a refined dial feed.

In other applications, the dial has been used with drilling and tapping machines and in conjunction with air or hydraulic devices.

A recently completed installation utilizes a dial feed machine, complete in itself, to assemble six components — fed by a similar number of hoppers — into a complex package at a rate of 105/min.

These advances dramatically illustrate the versatility of the dial feed. However, the unit remains a carrier for either parts or tooling, and preferably for parts, in all its applications.

It is in the field of press work where the dial feed continues to be most frequently applied and it is in this area where it makes some of its most valuable contributions to production.

Originally, dials were developed to handle specific pieces more rapidly, leading to more production per piece of equipment. These early, single-station attachments were actually one of the first forms of true automation.

Today, with greater demands on all production equipment, the trend is toward multiple-station

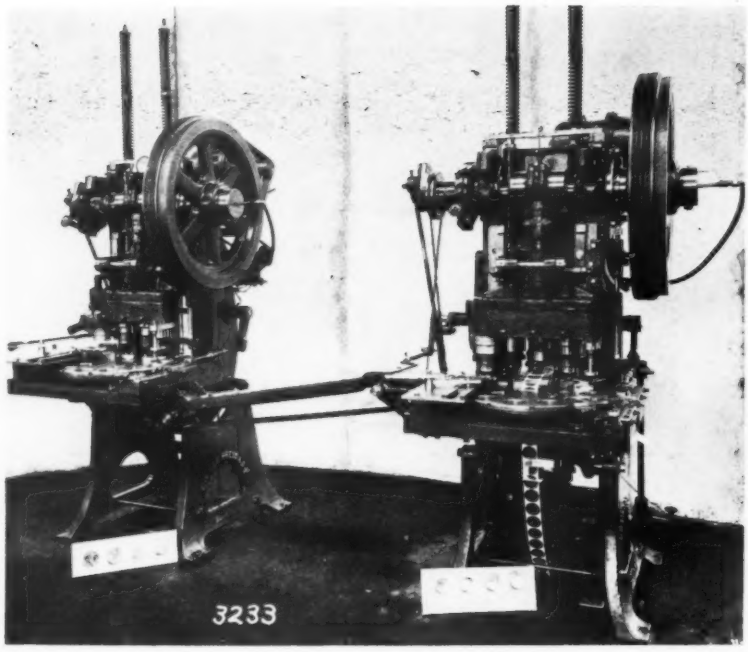


Fig. 1. You can use two dial-equipped presses in tandem as an approach to automation. The press on the left performs four operations and then automatically transfers the part to the dial on the right where additional work is done.

tooling of dial presses for a variety of operations, such as producing complete metal parts, assemblies, or both.

To the person concerned with the use of dials as a production adjunct, certain facts are of great importance. Perhaps the first thing to do is to forget the idea that dials are "wheels." An example of a straight-line dial is a chain carrier which conveyed a mica insulator through a pre-heating oven and into a water-cooled die where the part was molded to shape and cooled.

A dial feed must be engineered for the specific application for which it is intended. Engineers must determine, based on the material to be used, the sequence of operations, tooling, and the job to be done, the number of working stations and the total number of dial stations. If the dial is to be manually operated, this too must be considered and space provided.

Generally, operators are used where the production rate is low, where parts are too difficult to feed automatically, where parts are too fragile for automatic handling or where visual inspection of parts is necessary.

Hoppers are frequently used to bring parts to the dial feed. There are many types of hoppers that can be used and the designer of the feed will base his selection on size and shape of the part, speed, and functions other than feeding which may be assigned to the hopper. The vibratory hopper, often in conjunction with a vibratory rail, is most often used because of its extreme versatility.

Properly used, the dial feed is a valuable production asset. Insofar as possible, however, piercing should never be done in a dial but, if it is necessary, tools should be mounted below the dial and the dial arranged to carry the parts only. Piercing with tools carried by the dial is very likely to cause slugs to work in between the dial and dies, causing jams. While mounting tools below minimizes this danger, it does not, practically speaking, eliminate it.

In the field, dial feeds have turned in a remarkable record. One company substituted a single dial feed press for two presses,

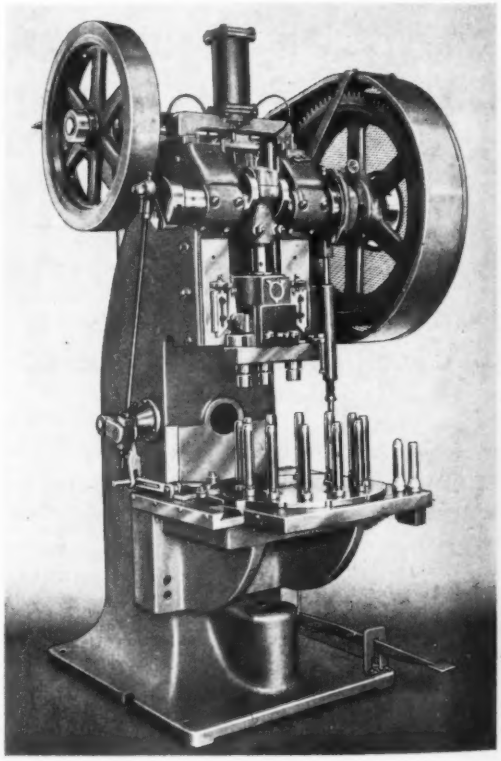


Fig. 2. This single dial fed press increased production by 600% in a painting operation on flashlight cases.

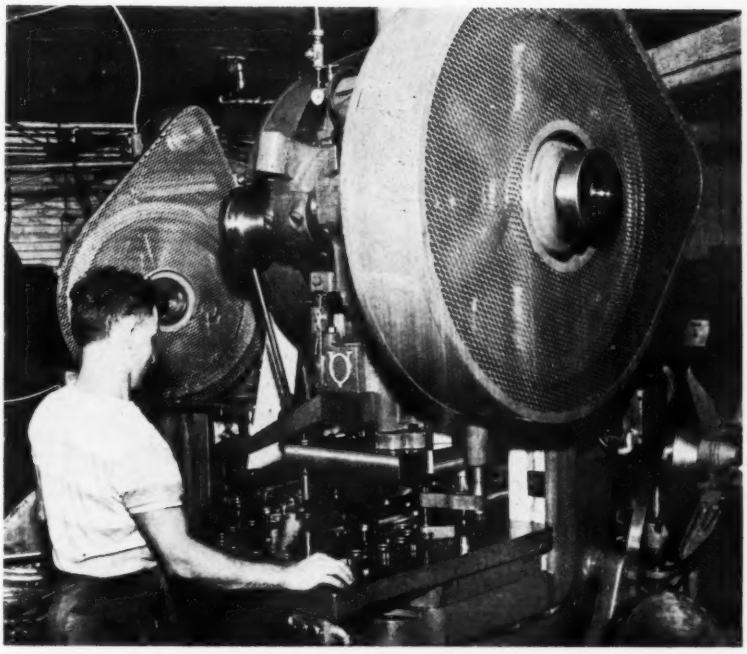


Fig. 3. A significant reduction in tool breakage and rejects was an added advantage when this dial-equipped press was assigned to the production of outer housings for ball bearings. A production increase of 200% also resulted.

each of which performed part of a pointing operation on flashlight cases. The two plain presses, with two operators, produced an average of 16 finished pieces/min. The dial press produced an average of 48 pcs/min, using one operator, for a production increase of 600%.

A 2000% boost in production was effected when an 18-station dial feed supplanted 13 smaller presses in the production of clamps for wood folding rules. Previously 14 men and 14 machines produced 6000 clamps daily. Now, in combination with one other press that makes the steel springs, the equipped press and two operators (one for each press) produce 20,000 clamps in the same working period. Sequence of operations performed by the dial feed are: Spring is stripped from the magazine, the female and male clamp halves are formed, an eyelet inserted and expanded, and the complete assembly delivered to a hopper.

Again, production of outer bearing housings increased 200% when a dial feed equipped press was put into operation. The old system of separate operations produced 20 housings/min; use of a five-station progressive die and an 18-station dial feed upped production to between 60 and 70 housings. Along with this, the user reported a significant decrease in tool breakage and parts rejection.

Another important contribution of the dial feed is in the area of press safety. Virtually without exception, the dial is arranged so that all manual operations are performed outside the tool area, thus automatically keeping the operator's hands away from danger zones.

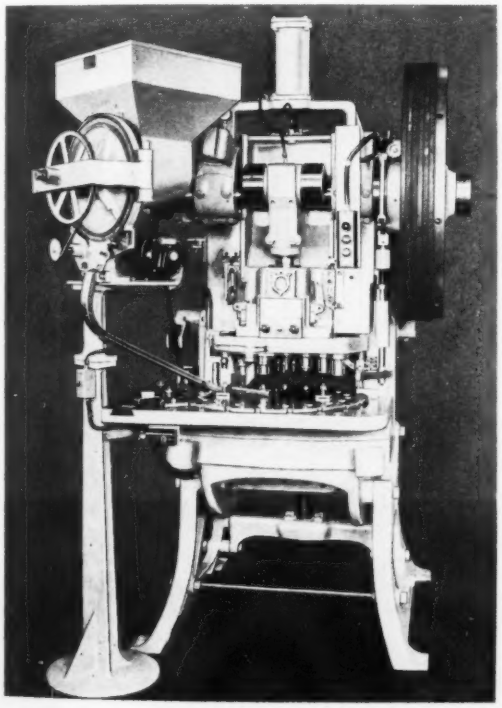


Fig. 4. Six operations are performed in this dial: first re-draw, second re-draw, trim, pre-curl, curl, and pierce bottom. Production rate is 110 pcs/min in this completely automatic unit. The operator merely attends the hopper and periodically makes a visual inspection of the parts.

In designing dial feeds, the engineer normally tries to keep the press standard so that the dial can be removed and the press used as a regular unit. However, where certain types of mechanical clutches are used to protect the dial, it is sometimes necessary to change the clutch before the press can be used without the dial. Since a dial equipped press usually operates at a lower speed than a standard press, it is necessary to replace the speed reducing mechanism when the press is to be used for regular press work.

There are some general rules that should be borne in mind for more efficient use of dial feeds:

1. Parts should be streamlined

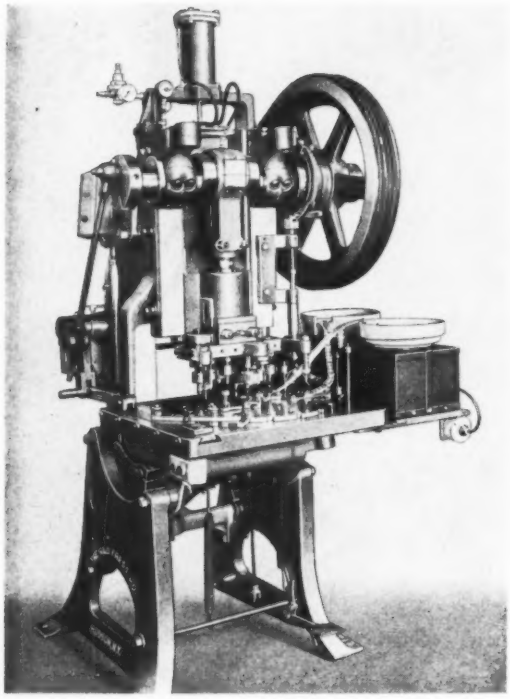


Fig. 5. Two vibratory hoppers feed this dial. From the rear hopper a tapered cup is inserted in the dial bushing. From the other, a drawn washer is transferred and inserted into the cup. Each part is checked for presence and position and crimped in two stations. The complete assembly is then automatically ejected. The press operates at 60 spm.

and designed with hopper feeding in mind. Generally, the more complicated the shape, the more complicated the feeding.

2. Round parts are best — but odd shapes can be handled without too much trouble.

3. The quality of work turned out by the dial depends in large degree upon the quality of components fed into it. The closer the tolerance to which the blank has been held, the more accurate the finished part.

4. Assembly operations will be performed more smoothly and accurately if all components are made precisely.

5. Assembly is easiest with parts that are close to round, with clearance provided between parts.

6. The less orientation of parts required, the simpler the assembly operation.

For those operations where production runs are normally long and more than one component or related operation is involved, dial feeds offer a practical, proven method of automating production. Because the dials and auxiliary equipment are external, it is frequently possible to tool an existing press, or to reclaim the equipped press for regular press work, thus achieving a significant savings in capital investment.

Extra copies of this article are available while supply lasts. Write Tooling & Production Magazine, 1975 Lee Road, Cleveland 18.

Steel Selection Simplified By New 'Steelector'

A new plan for tool steel users gives promise of lowering their tool steel inventories and at the same time simplifying choice of tool steels.

Allegheny Ludlum Steel Corp.'s new Steelector program, the result of intensive study, presents 18 grades of tool steel which will handle 96% of all tool steel applications.

A number of selection aids are in the program, one of which is a pocket-size card which helps a customer decide at a glance the tool steel best suited for maximum performance on his particular job. Without the card a customer may have to consider steels covered by more than 1000 brand names to find the one he wants.

The program concentrates on a basic set of steels that are 1) comprehensive of applications, 2) easily and accurately selected, and 3) immediately available in sizes needed. Grades are listed on three cards showing comparative ratings of the five basic steel properties that are most widely required: abrasion resistance, toughness, size stability, machinability, and red hardness. The 18 selected grades are distributed among three categories: hot work, high speeds, and tool room steels — which accounts for the three cards.

A customer seeking a tool steel with maximum abrasion resistance, in which shock also is a condition, can study the card graphs and find the grade with the best balance in these properties.

In addition to the card charts, Data Stock Lists provide specific information as to characteristics, heat treatment, application, and availability of the grade chosen.

875 DOLLARS

Buys this CLAUSING Vertical Miller

And look what you get!

1. **ACCURACY VERIFIED** to within TENTHS—
   - Spindle taper (internal) runout within .0002″ at spindle nose.
   - Spindle square with table, front to rear, within .001″ TIR in 5″ circle.
   - Top of table square with column ways within .0005″ in 6″ travel.
   - Table T-slots parallel to table dovetail ways within .0005″ in 8″ longitudinal travel.

   These and other tests showing exact indicator readings are on the report accompanying your machine.

2. **VERSATILITY**—The Clausing mills, drills, bores, reams, and shapes . . . at all angles . . . with one work set-up! It's perfect for general production, experimental, layout, and light jig-bore work.

3. **EFFICIENCY**—Users report that "*the Clausing is the easiest to set up, get around and operate of any mill . . . and it has sensitivity you don't get in larger machines—a mighty important factor when using small cutters.*"

Make any comparison you want . . . We're sure you'll agree the CLAUSING vertical mill is truly an *outstanding* machine tool value! Write for a catalog today.

148

CLAUSING
DIVISION OF
ATLAS PRESS COMPANY

OUTSTANDING VALUES IN PRECISION EQUIPMENT

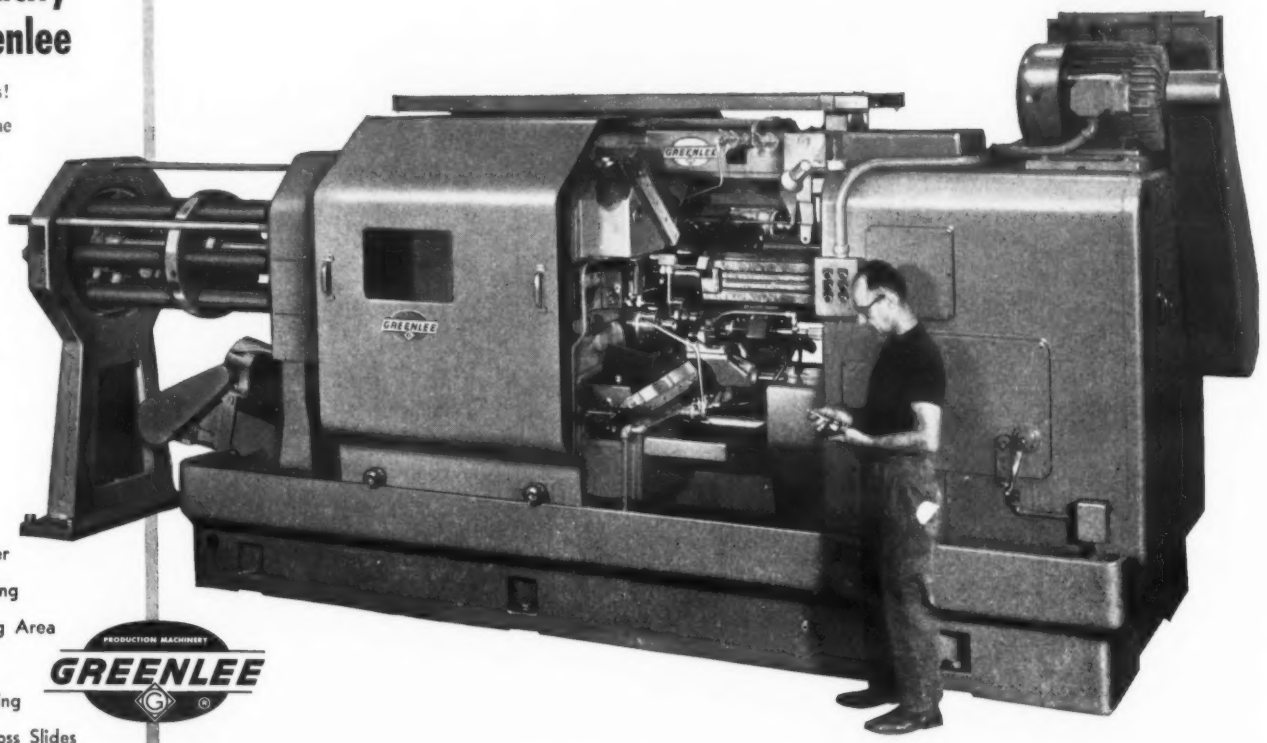
10-118 N. PITCHER STREET, KALAMAZOO, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 69

Now . . . 3½" Capacity With This New Greenlee

Biggest of the Greenlee Bar Automatics! This new 3½"— 6 spindle model offers the most outstanding advantages in the field. It is exceptionally versatile. It offers well-known Greenlee dependability. Like all Greenlee Automatics it has independent, cam-operated cross slides and a wide-open tooling area. Greater flexibility, accuracy and productivity are built into this big, powerful Greenlee Automatic. Check these outstanding advantages:

- Permanently Aligned Spindle Carrier
- Positive, High-Speed Carrier Indexing
- Wide-Open, Easily Reached Tooling Area
- Sturdy, Cam-Feed Main Tool Slide
- Interchangeable Cross Slide Camming
- Micrometer Adjustment On All Cross Slides
- Rapid-Shift, Dual-Range Speed and Feed Gears
- Built-in Lead Screw Threading Feed and Drive



PRODUCTION MACHINERY
GREENLEE

GREENLEE BROS. & CO.
1944 MASON AVENUE, ROCKFORD, ILL.

Other Greenlee 6 Spindle Bar Automatics are offered in 1", 1⅝", 2" and 2⅝" capacities.

TRANSFER MACHINES • SPECIAL MACHINES • SIX AND FOUR SPINDLE AUTOMATICS • TRIM PRESSES • DIE CASTING MACHINES • WOODWORKING MACHINES AND TOOLS • HYDRAULIC AND HAND TOOLS

CIRCLE INFORM-A-GRAM KEY NO. 70

READER SERVICE CARD OCT. 1960 ISSUE

Do Not Use This Card After Dec. 31, 1960

INFORM-A-GRAM

YOUR NAME _____ YOUR TITLE _____
(Please Print or Typewrite)

TOOLING & PRODUCTION:
Please have information on items circled sent to me.

COMPANY NAME _____

COMPANY ADDRESS _____

CITY _____ ZONE _____ STATE _____

Is this issue of Tooling & Production Magazine addressed to you? Yes ☐ No ☐

Please use only one of these INFORM-A-GRAM cards for yourself (and let one of your associates use the other).

ADVERTISEMENTS

2	15	29	41	74	95	873	1052	1112	1134	1165	1213	1253	1292	1331
3	16	30	42	75	96	901	1071	1113	1135	1171	1214	1261	1293	1332
4	17	31	43	78	97	902	1072	1114	1141	1181	1221	1262	1301	1333
5	18	32	44	79	98	903	1073	1115	1142	1182	1222	1263	1302	1334
6	19	33	45	82	100	904	1074	1121	1143	1191	1231	1271	1303	1341
7	20	34	46	84	101	991	1075	1122	1144	1192	1232	1272	1304	1351
9	21	35	47	85	103	992	1076	1123	1151	1193	1233	1273	1305	1352
10	22	36	48	88	104	993	1077	1124	1152	1194	1241	1274	1311	1353
11	23	37	50	89	137	1021	1091	1125	1161	1201	1242	1281	1312	
12	25	38	69	91	138	1022	1092	1131	1162	1202	1243	1282	1313	
13	26	39	70	93	871	1023	1093	1132	1163	1211	1251	1283	1321	
14	27	40	71	94	872	1051	1111	1133	1164	1212	1252	1291	1322	

EDITORIAL ITEMS

A1	C11	C23	C35	C47	C59	P10	P22	P34	P46
A2	C12	C24	C36	C48	C60	P11	P23	P35	P47
C1	C13	C25	C37	C49	C61	P12	P24	P36	P48
C2	C14	C26	C38	C50	P1	P13	P25	P37	P49
C3	C15	C27	C39	C51	P2	P14	P26	P38	P50
C4	C16	C28	C40	C52	P3	P15	P27	P39	P51
C5	C17	C29	C41	C53	P4	P16	P28	P40	P52
C6	C18	C30	C42	C54	P5	P17	P29	P41	P53
C7	C19	C31	C43	C55	P6	P18	P30	P42	
C8	C20	C32	C44	C56	P7	P19	P31	P43	
C9	C21	C33	C45	C57	P8	P20	P32	P44	
C10	C22	C34	C46	C58	P9	P21	P33	P45	

Which article in this issue was of most interest to you? _____

THESE INFORM-A-GRAM CARDS are for the convenience of TOOLING & PRODUCTION readers who, we know, rarely have stenographic help at their beck-and-call while reading. To get further information concerning selected items featured —all one needs is an INFORM-A-GRAM card and a pencil or pen to circle the number of the items wanted. If there is no identifying number, use the page number.

Our reader service department is handling over 100,000 reader inquiries per year, and it is essential that the blanks at the top of each card be filled in accurately and completely. Please use only one of these INFORM-A-GRAM cards for yourself and let one of your associates use the other.

READER SERVICE CARD OCT. 1960 ISSUE

Do Not Use This Card After Dec. 31, 1960

INFORM-A-GRAM

YOUR NAME _____ YOUR TITLE _____
(Please Print or Typewrite)

TOOLING & PRODUCTION:
Please have information on items circled sent to me.

COMPANY NAME _____

COMPANY ADDRESS _____

CITY _____ ZONE _____ STATE _____

Is this issue of Tooling & Production Magazine addressed to you? Yes ☐ No ☐

Please use only one of these INFORM-A-GRAM cards for yourself (and let one of your associates use the other).

ADVERTISEMENTS

2	15	29	41	74	95	873	1052	1112	1134	1165	1213	1253	1292	1331
3	16	30	42	75	96	901	1071	1113	1135	1171	1214	1261	1293	1332
4	17	31	43	78	97	902	1072	1114	1141	1181	1221	1262	1301	1333
5	18	32	44	79	98	903	1073	1115	1142	1182	1222	1263	1302	1334
6	19	33	45	82	100	904	1074	1121	1143	1191	1231	1271	1303	1341
7	20	34	46	84	101	991	1075	1122	1144	1192	1232	1272	1304	1351
9	21	35	47	85	103	992	1076	1123	1151	1193	1233	1273	1305	1352
10	22	36	48	88	104	993	1077	1124	1152	1194	1241	1274	1311	1353
11	23	37	50	89	137	1021	1091	1125	1161	1201	1242	1281	1312	
12	25	38	69	91	138	1022	1092	1131	1162	1202	1243	1282	1313	
13	26	39	70	93	871	1023	1093	1132	1163	1211	1251	1283	1321	
14	27	40	71	94	872	1051	1111	1133	1164	1212	1252	1291	1322	

EDITORIAL ITEMS

A1	C11	C23	C35	C47	C59	P10	P22	P34	P46
A2	C12	C24	C36	C48	C60	P11	P23	P35	P47
C1	C13	C25	C37	C49	C61	P12	P24	P36	P48
C2	C14	C26	C38	C50	P1	P13	P25	P37	P49
C3	C15	C27	C39	C51	P2	P14	P26	P38	P50
C4	C16	C28	C40	C52	P3	P15	P27	P39	P51
C5	C17	C29	C41	C53	P4	P16	P28	P40	P52
C6	C18	C30	C42	C54	P5	P17	P29	P41	P53
C7	C19	C31	C43	C55	P6	P18	P30	P42	
C8	C20	C32	C44	C56	P7	P19	P31	P43	
C9	C21	C33	C45	C57	P8	P20	P32	P44	
C10	C22	C34	C46	C58	P9	P21	P33	P45	

Which article in this issue was of most interest to you? _____

Postage Will Be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 7879, CLEVELAND, OHIO

TOOLING & PRODUCTION MAGAZINE

P.O. BOX 3505

CLEVELAND 18, OHIO

Postage Will Be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY MAIL

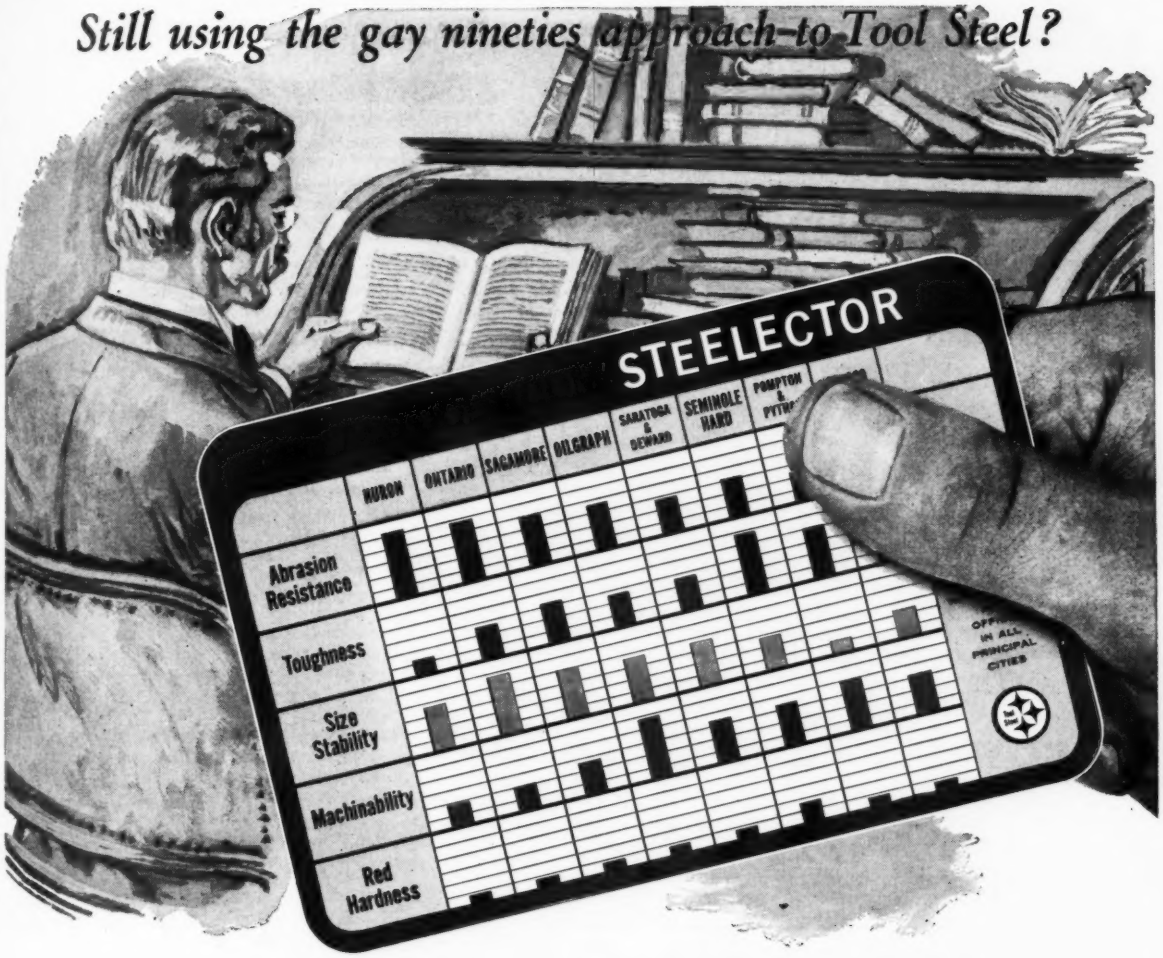
FIRST CLASS PERMIT NO. 7879, CLEVELAND, OHIO

TOOLING & PRODUCTION MAGAZINE

P.O. BOX 3505

CLEVELAND 18, OHIO

Still using the gay nineties approach to Tool Steel?



Use the New, Modern A-L Steelector System

Now you can accurately select the proper tool steel based on its individual characteristics and be sure that it's available for off-the-shelf delivery before you place your order.

The new Allegheny Ludlum STEELECTOR Program makes tool steel selection fast. And it eliminates the embarrassment of specifying a grade which later turns out to be unavailable or available only after a costly delay.

The leading grades of tool steel that meet 96 percent of all applications—as listed in the Allegheny Ludlum Tool Steel Handbook—form the basis of the STEELECTOR Program. The STEELECTOR Grades are charted on cards covering each group of steels (tool room, hot work, and high speed grades) to help you select the particular grade best for your application.

Bar graphs on each STEELECTOR Card show how the various grades compare in abrasion resistance, toughness, size stability, machinability and red hardness. It's easy to determine accurately the combination of properties that best suits the job at hand.

The complete necessary range of sizes and shapes is listed in a special Data Stock List for every grade. These lists also include heat treating, typical working hardnesses and other data to insure that your selection is correct.

You can choose with confidence because every STEELECTOR grade has been selected from the complete line of Allegheny Ludlum Tool Steel and made under the rigid quality control standards of all A-L products.

For a complete explanation of the STEELECTOR Program, ask your Allegheny Ludlum sales representative for a copy of the colorful A-L Tool Steel STEELECTOR Booklet, or write: ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pennsylvania. Address*** *Dept. TP-10.*

STEELECTOR PROGRAM

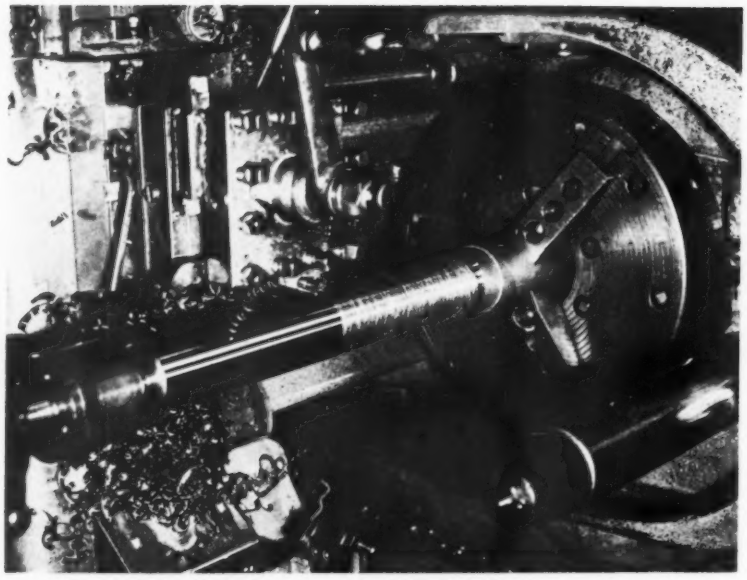
ALLEGHENY LUDLUM

Tool Steel warehouse stocks throughout the country

AL®

2068

CIRCLE INFORM-A-GRAM KEY NO. 71



Operating Data

Material	1¼% Nickel-Chrome alloy
Stock Removal	0.150" roughing 0.020"-0.030" finishing
SFPM	675 roughing 1125 finishing
Feed	80 CPI roughing 40 CPI finishing

Fig. 1. A finish of 30 micros was achieved on this torsion tube with ceramic tool operating at speeds and feeds 2½ times greater than possible with carbide.

Ceramics Can Take It--

and at faster feeds and speeds

Experiments on production work show that ceramic tools cut costs while they cut metal. These case histories from Alvis Ltd., Coventry, England are real eyeopeners.

by Horace Frommelt

Mr. Frommelt is Director of the Manufacturing Research Center at Ferro Powdered Metals, Inc., Salem, Indiana.

BABYING AND CODDLING TOOLS is not for production line techniques. Many think extreme care is necessary to machine with ceramics. But many examples of conversion to ceramics disproves this thinking. Not only can ceramics be used in the rough and tumble of everyday shop procedure, but they have decided advantages for production work. Advantages prove out as machining cost reductions, better finishes, and machining to closer tolerances.

Results shown here are the reward of painstaking experimental machining and designing. Polishing the technique aspects of applying ceramics to toolholders, experimenting with cutting angles, and a host of other details were carefully considered. Behind all this was the need for the metal removal specialist to always keep cost reduction in mind.

In one application, ceramics replaced carbide for machining a 130,000 psi, 1.25% nickel-chrome torsion tube. A non-standard toolholder, designed by Alvis, was used on a #7 Herbert Pre-Optive lathe with a 10-hp motor (Fig. 1). The speeds and feeds with the ceramic tool are approximately 2½ times faster than could be specified for good carbide results. Pieces/edge increased from 6-7 with carbides to 45-50 with ceramics. All of this, and still a finish at the end of tool life of about 30 micros!

This operation is now done as a regular production job with a man-hr savings of 30% and it requires no more attention than any other high speed or carbide job.

Fig. 2. Steel recoil sleeve, machined at 700 sfpm with ceramic tool in 45° lead angle holder, has good finish. Carbide tool produced only 4-5 pcs/edge compared to 29 pcs/edge with ceramics.

Operating Data

Material	.15C, 1.7 Mn, .4 Ni, .25 Cr (70,000-90,000 psi)
Stock Removal	0.040"-0.045"
SFPM	700
Feed	80 CPI

Conversion to ceramics allowed a two-fold increase in speed for machining a recoil sleeve on a Gisholt No. 4 lathe with a 25-hp motor (Fig. 2). Tungsten carbide tools produced no more than 4-5 parts/edge compared with 29 parts/edge attained with ceramics. Again, note the good finish. One edge of the ceramic insert completed a turning length of 34′ whereas six carbide edges had been required for the same length.

The length turned per piece is of great importance when considering tool life. Turning a shaft 10′ long is one thing; turning 10 shafts 1′ long is an entirely different job. The number of entrances is a decisive factor in tool life and should be considered when evaluating tool performance.

The speed of 700 sfpm attained with ceramics on the cast iron flywheel, shown on the Fischer copy lathe (Fig. 3), is 2½ times greater than is normally considered good practice with carbide on the same material. A new toolholder design is expected to increase the rpm to

. . . continued on page 76

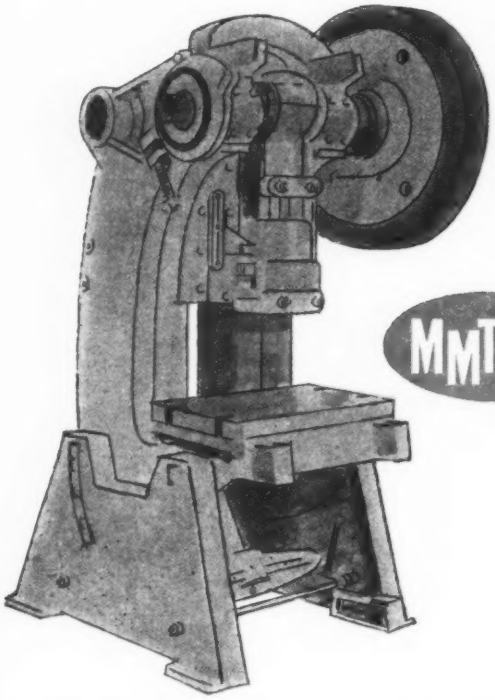
Fig. 3. Ceramic tip machined 13 of these cast iron flywheels with modest wear; carbide tip only did 7. Speeds were upped by 2½ times with ceramics.

Operating Data

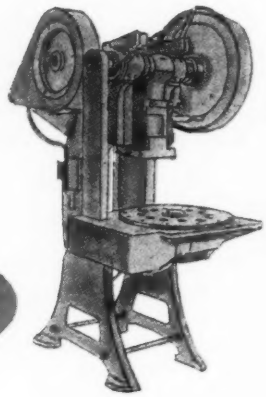
Material	Cast iron (80,000 psi)
Stock Removal	0.270" - 0.300"
SFPM	700

Federal's dependability assures lower production costs longer press life!

7 TO 125-TON CAPACITY

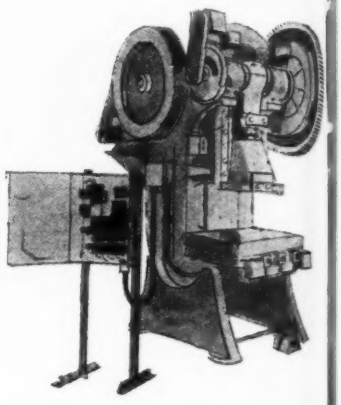


MMT=PE



FEDERAL
DIAL FEED PRESSES

Up to 20 multiple station operations — up to 300 indexes per minute. Hardened and ground indexing cam assures accuracy and smooth operation. Available with automatic parts-feeding and ejecting devices. Gear or chain driven. Safety mechanism protects dies.



FEDERAL
AIR-CLUTCH PRESSES

The new Federal Friction-type Air Clutch is designed specifically for presses. Flywheel mounting reduces mass to be put into motion. Fast engaging and disengaging at any speed. Uniform torque distribution — shock-free engagement. Fail-safe operating controls.

FEDERAL GIVES YOU MORE!

Every Federal is built to your specifications with the highest quality materials, and Federal's well-known precision workmanship. The result — dependable service . . . lower production costs, and longer press life, even under the most rugged conditions. Check the quality features at the right. Then check with Federal on your next press requirements.

QUALITY FEATURES

- Meehanite Cast Frames
- Replaceable Bronze Bushings
- Magnaflux Inspection
- Oversized Crankshaft Bearings
- Front-operated Recline
- Longer Rams and V-ways
- Exclusive Non-repeat Clutch Mechanism
- Timken Roller Bearing Flywheels

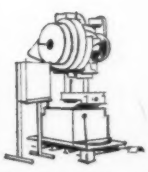
NOTE: Federal's reputation for service is equally well-known, and most orders for Genuine Federal Parts are shipped the same day.

FEDERAL

open-back inclinable

PRESSES

Horizontal Presses



Flying Cutoff Presses

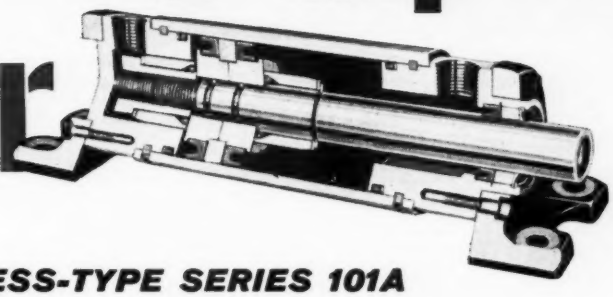
Extruding Presses

Dial Feed Pr

HE FEDERAL PRESS COMPANY of Elkhart, Indiana, Dept. 8

CIRCLE INFORM-A-GRAM KEY NO. 74

America's First cO-Mpact Cylinder



INTERNAL KEY TIE-RODLESS-TYPE SERIES 101A

Air 150 psi—Hydraulic up to 1500 psi

Fits where others won't

Meets JIC Standards, Bulletin 101A

Ruggedly constructed of steel with bronze bearings, this original space-saving cylinder is the most compact, streamlined and versatile cylinder available. It requires one-third less installation space and has a greater ratio of power to its size and weight than tie-rod-type cylinders with the same bore and psi rating. In addition, the ports can be rotated independently to any convenient location. It is easier to disassemble, for inspection and service and to re-assemble than any conventional-type cylinder. And, by using a majority of standard parts and one or two semi-standard parts, this component gives you the advantage of special cylinders that do a better job at a nominal cost.

Like all O-M cylinders, this compact unit has the lowest coefficient of friction. It is designed right to seal right . . . to make full-power starts on thrust and return strokes . . . to maintain perfect rod alignment . . . and cushion piston shocks. End plugs are tapped for universal mounting.

Coupon brings Bulletin desired.

Bulletin 101A for Internal Key Tie-Rodless Type Air and Hydraulic Cylinders featured above.
Bulletin 105A—Improved Tie-Rod (Heavy-Duty) Cylinders Hydraulic 2000 psi; 3000 psi non-shock.
Bulletin 107—Automation (Heavy-Duty) Air Cylinder for 200 psi operation.
Bulletin 108—Automation (Heavy-Duty) Hydraulic Cylinder —for 1000 psi operation.

All O-M Cylinders are available in 1½" to 8" bores with standard or heavy-duty rods. Complete line of mounts and interchangeable parts. Immediate delivery on most sizes. **MAIL COUPON TODAY.**

ORTMAN-MILLER MACHINE COMPANY
21 143rd Street, Hammond, Indiana

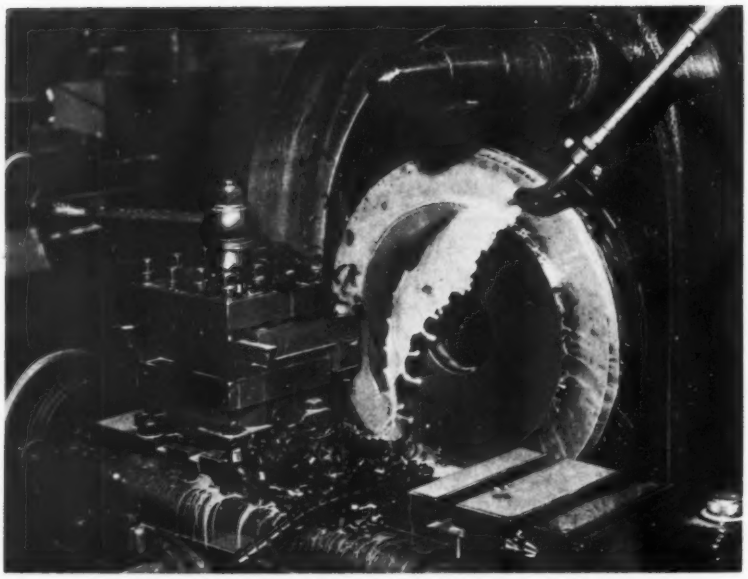
☐ Have representative call

Send Bulletins

☐ 101A ☐ 107
☐ 105A ☐ 108

NAME_____ POSITION_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE_____ STATE_____

CIRCLE INFORM-A-GRAM KEY NO. 75



Operating Data

Material	S .76
Stock Removal	0.300"
RPM	variable from 81-198
Feed	80 and 60 CPI
Tool Signature	45° lead, 6° top, 45° to cutting edge.

Fig. 4. This clutch plate operation was to face to width and turn OD to size. Speeds increased from 64-81 rpm range with carbide to 81-198 rpm with ceramic. Job required coolant. A Stupalox insert was used in a Herbert holder with Alvis chipbreaker clamp.

. . . **Ceramics, from page 73**

1000. On this part, a drag cut had to be made from the center to the OD. Its width was ⅝".

Ceramic tips machined 13 of these parts with modest and incomplete wear while only seven parts had been regularly done with carbide tips.

An interesting replacement of carbide with ceramic is the turning of an S. 76 clutch plate on a No. 9 Herbert lathe (Fig. 4). The operation called for facing to width and turning the OD to size. Sixteen parts are machined with one ceramic tip. Speeds were increased from a range of 64-81 rpm with carbide to from 81-198 rpm with ceramic. The feed rate remained the same at 80 cpi.

Four changes of speed were necessary with the ceramic tips in order to control the chip. Switching to a Pre-Optive machine could improve this situation. Efforts are underway to make further improvements in the job by reducing the 45° lead angle of the tool to 15°.

Fig. 5. Scale on oil ring retainer seat caused excessive carbide wear. Ceramics increased tool life 150% and upped speed from 410 sfpm to 1500 sfpm.

Operating Data

Material	288 gun metal casting
Stock Removal	0.200" dia 0.250" face
SFPM	912-1500
Feed	120 CPI dia hand feed face

Operating Data

Material	110,000 psi steel
Stock Removal	0.150"-0.170" roughing
	0.015"-0.020" finishing
SFPM	575 roughing
	900 finishing
Feed	50 CPI roughing
	83 CPI finishing

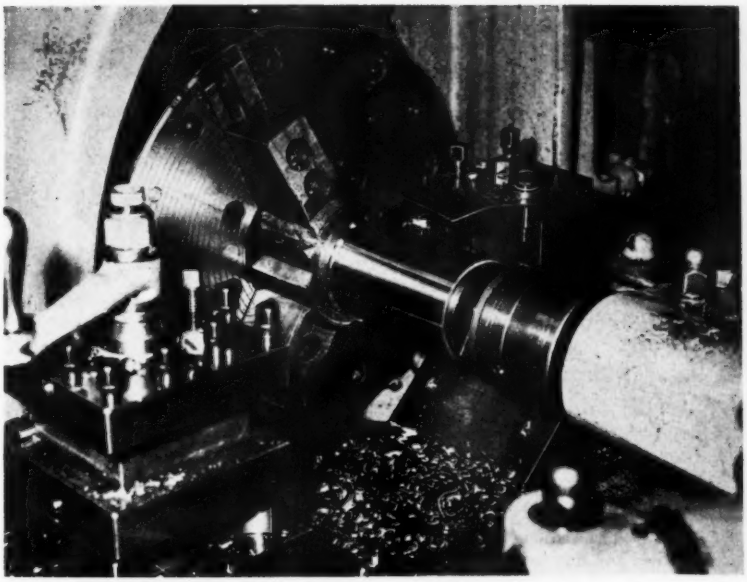


Fig. 6. A finish of 20 micros was produced on piston damper sleeve with ceramic tool.

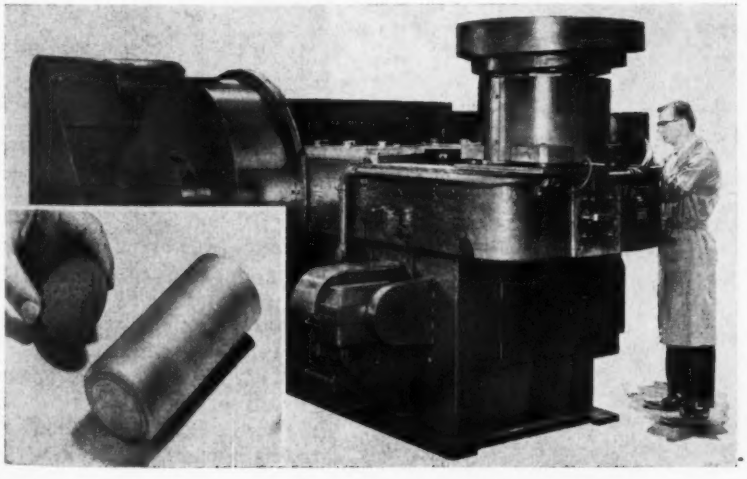
In another conversion success story, parts produced increased by 150%. The job was a 5" dia oil ring retainer seat made of cast gun metal (Fig. 5). Scale on the surface of this job made good tool life with carbide impossible. In this case, speeds were upped from 410 sfpm with carbide to a maximum of 1500 sfpm with ceramics. Feeds also were boosted — from 105 cpi to 120 cpi.

A final example of superior ceramic performance involves a 110,000 psi steel piston damper sleeve machined on a Herbert Pre-Optive lathe with a 15-hp motor (Fig. 6). Parts/edge range from 4-45 with ceramics, and a finish of 20 micros is produced at the end of tool life. The bore on this operation is still being done with carbides. Test runs were first made with a 45° lead angle tool; a special Alvis toolholder is now used.

Ceramic tooling is now standard on all of the examples cited and results have been consistently good. Experiences such as these prove that ceramic tools can effectively and economically handle production line jobs.

Extra copies of this article are available while supply lasts. Write Tooling & Production Magazine, 1975 Lee Road, Cleveland 18.

Press Extrudes 120 Cans a Minute

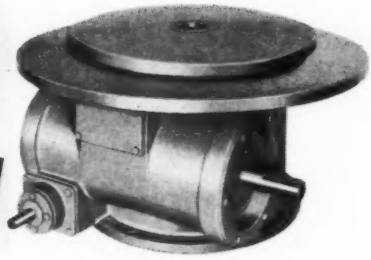


A ⅛" thick aluminum blank 2½" in diameter becomes a seamless beverage can more than 5" high in just half a second in a new extrusion press developed by the National Machinery Co., Tiffin, O.

The 300-ton impact "Maxipres" bangs out 120 can/min, delivering them ready for trimming, flanging, cleaning, coating, filling and closing. It will soon go to a brewery in the West.

A simple die adjustment varies bottom thickness of the can while the press is running. A tonnage indicator shows the force transmitted to the cast steel bedframe, which absorbs the shock of impact extrusion. The entire unit weighs 48,000 lbs.

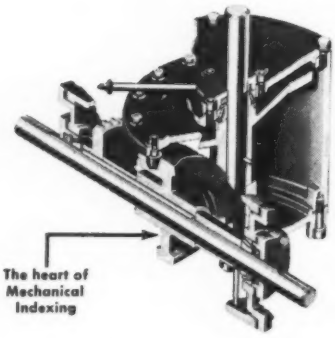
Why Index Mechanically



Important Features of Mechanical Transfer–

● SHOCK FREE TRANSFER OF MASSIVE LOADS

Made possible by cams designed and built to precise specifications to provide a high speed index or transfer motion with controlled acceleration and deceleration. Transfer is never free—it is always contained by a tapered follower in the tapered cam path.



The heart of Mechanical Indexing

● ACCURACY OF INDEX

No other means provides such a high degree of precision repeatability of index. Regardless of number of positions accuracy is maintained by two followers which straddle the dwell portion of the cam.

● SYNCHRONIZED TOOLING ACTUATION

Continued motion of the index cam shaft provides the power and basic motion for tooling actuation with positive mechanical interlock.

● INHERENT LOW MAINTENANCE

Standard Tool indexing equipment is practically maintenance-free due to its extreme precision manufacture and its carefully balanced components. Tapered roller bearings used throughout provide long durable service.

● TECHNICAL BOOKLETS

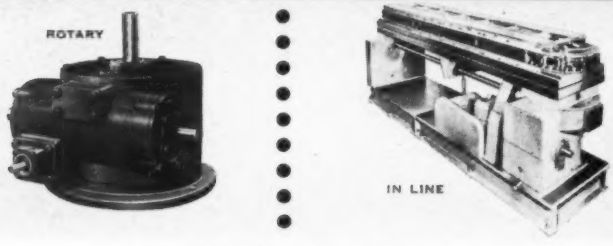
Fact-filled booklets showing indexing positions, tolerances, available dial and tooling plates, load ratings, dimensions and other information are available without cost. Standard Tool engineers will be pleased to assist you in selecting the indexing unit best suited to your particular requirements.

MACHINERY DIVISION

STANDARD TOOL & MANUFACTURING CO.

706 SCHUYLER AVENUE LYNDHURST, NEW JERSEY

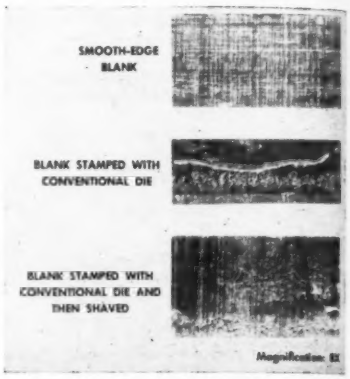
SELECT FROM A FULL RANGE OF UNITS—IN LINE OR ROTARY



CIRCLE INFORM-A-GRAM KEY NO. 78

Precision Blanks Made In Single Operation

Precision stamped blanks with straight, smooth edges are produced in a single operation by a new high speed process which eliminates the need for shaving operations. Surface finish of the blank edge is comparable to that produced by grinding, and accuracies of 0.0005″ and closer are possible with the Smooth-Edge process developed by Hydro-Cam Engineering Company.



Parts such as gears, gear racks, pieces with precision holes or contours, small extrusions and any other type requiring smooth, accurate edges are specially suited for the process. They're stamped from either coil or strip stock with special dies in a triple-action, high speed, hydraulic press capable of up to 120 spm.

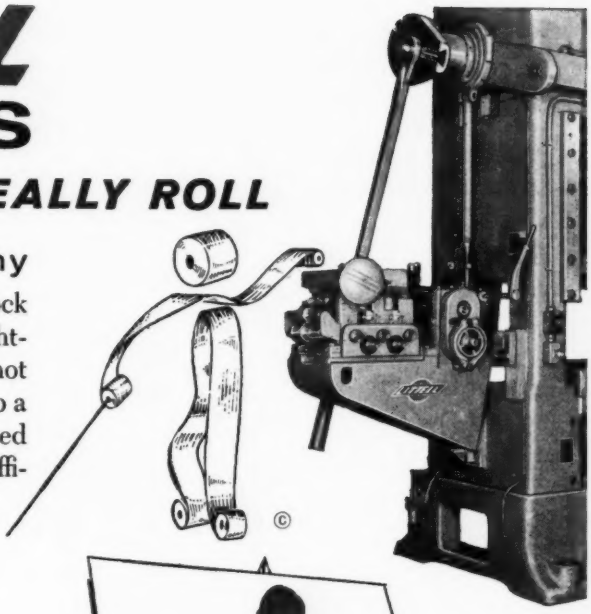
The dies firmly clamp the work during the shearing sequence so that material along the line of shear is restricted from flowing or tearing, and a smooth edge results. Steel, brass, aluminum, and copper parts from 0.010″ to 3/16″ thick have been successfully and economically made with smooth holes and edges.

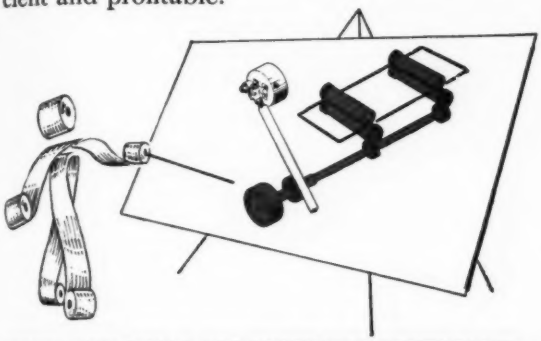
LITTELL ROLL FEEDS

Make Press Production REALLY ROLL

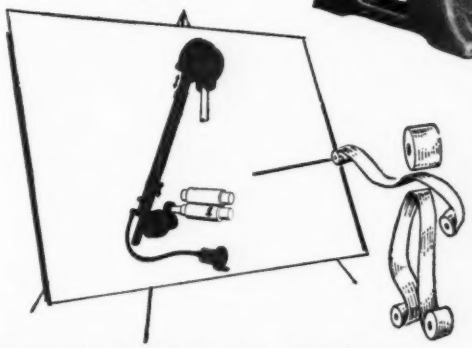
Old Pro "Coily" Points Out Why

"Coily" has been around press rooms since coil stock came into the picture. He has seen Littell Straighteners and Feeds widely copied, in design, (but not in performance) time after time. He points here to a few of the new advanced design Littell Roll Feed features that make punch press operation more efficient and profitable.

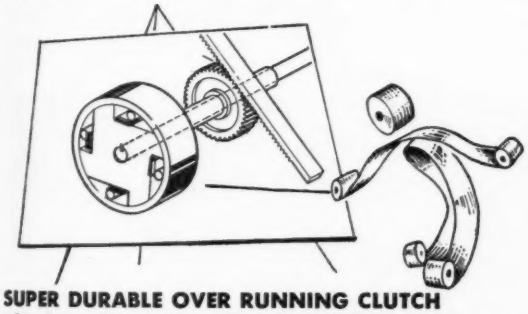




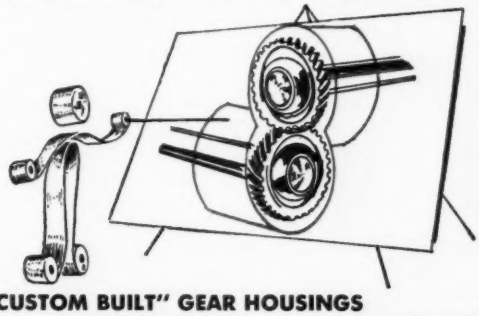
GEARS AND ROLLS ARE PRECISION CONTROLLED
Littell Rolls and Gears respond to control because they are light in weight. With less inertia to overcome, these strong, yet light rolls and gears start easy, go faster, and stop quickly. Big, new type disc brakes further assure the control that means accurate feeding in the higher speed ranges.



LITTELL MICRO RUNNING ADJUSTMENT
enables the punch press operator to adjust feed length plus or minus ⅛" while press and feed are running. A big help in setting up progressive dies requiring extremely accurate feed lengths.



SUPER DURABLE OVER RUNNING CLUTCH
Thanks to the exclusive Littell carbide cam construction that Coily points to, not a single clutch of this type has worn out in ten years of operation!



"CUSTOM BUILT" GEAR HOUSINGS
permanently hold Littell spiral gears in perfect alignment because each gear housing is specially machined for the individual spiral gears it seals in oil and protects. A Littell sustained accuracy feature.

2 New Bulletins For Punch Press Operators

Bulletin A-11
Describes Roll Feeds
For OBI Presses

Bulletin A-15
Describes Roll Feeds
For Straight Sided Presses

For free copies, address your request now.

F. J. LITTELL MACHINE CO.

4197 N. Ravenswood Ave., Chicago 13
District offices: Detroit, Cleveland

ROLL FEEDS • SHEETING LINES • STRAIGHTENING AND FEEDING MACHINES • REELS AND CRADLES FOR COIL STOCK

CIRCLE INFORM-A-GRAM KEY NO. 79

How Chisholm-Ryder SLASHED $ Hole Punching and Notching COSTS

by Ralph L. Weisbeck

Mr. Weisbeck is with the Punch Products Corporation, Buffalo, New York.

TODAY WITH RISING COSTS, management looks hopefully to tooling and methods departments for new manufacturing techniques to not only offset these increases but to actually lower manufacturing costs. With this in mind, the tool and methods groups at Chisholm-Ryder Company, Inc., Niagara Falls, New York, manufacturers of food processing equipment and farm harvesting equipment, uncovered a previously overlooked area of cost reduction in producing sheet metal parts.

In the past, the sheet metal department received very little consideration in the tooling budget due to the relatively low production of 25 to 250 units/yr. Although 20 to 30% of the parts were structural or sheet metal, tooling was by-passed, generally due to the opinion that low production requirements eliminated any possibility for substantial savings.

Normal shop practice was to send the production order with blueprint for sheet metal or structural parts to department foreman to produce the required parts by his own methods on available equipment. With limited press facilities most of the hole punching was performed on a single hole puncher equipped with drop gages. Notches were nibbled, hand-chiseled or burned out depending on size and material thickness. Parts were formed on a power driven bending brake. These methods produced acceptable finished parts but at high costs.

In order to find some answer to this high cost, an analysis was made by the Chisholm-Ryder methods group who summarized the following tooling requirements for the sheet metal department:

1) Low cost tooling or tools that could be amortized over a large number of parts.

2) Versatile tools that could be adapted to light and heavy sheet metal, and structural angle parts.

3) Equipment with maximum flexibility that can be easily handled and quickly changed from one setup to another.

4) Tooling that could be set up

Fig. 1. In a matter of minutes, one hole punching setup can be removed and another slid into press bed.

Fig. 2. Unipunch units, templates, and accessories are compactly shelved adjacent to the press. Punches and dies are always sharpened, if necessary, before being returned to storage.

by average press room operators not requiring special skills.

5) Low cost inventories.

6) Tooling that will permit combining of operations such as hole punching and notching.

Unipunch Hole Punching and Notching Units produced by Punch Products Corporation, filled all the above requirements. Although this tooling had been used in the past whenever possible, lack of press facilities greatly limited its full saving potential and effectiveness. A further study proved that savings of 40 to 50% would be realized with expanded use of Unitized tooling if a large press brake was available with sufficient tonnage for multiple punching and notching over a large area.

Following management approval of the expenditure for a new press brake, this tooling program was put into operation. A 12′ press brake was selected with wide ram and bed angle supports. The angle supports provided the increased area necessary for complete hole punching and notching of large parts in one operation. The hole punching units are actually self-contained tools with the die in the lower arm of the holder and the punch free-floating in the upper arm. Nothing is attached to the upper ram of the press brake as the units are self-stripping.

Templates, ½″ thick, are drilled for hole patterns and the self-contained units are easily mounted according to hole punching pattern.

This can be done outside the press while another setup is running in the press. In a matter of minutes, one setup can be removed and another slid onto press bed, Figure 1. Only the templates are stored while the units are used and reused over and over again. Two or more short template setups can be run side by side for a pass along operation.

For maximum efficiency, the hole punching and notching units, templates and accessories are stored adjacent to the press brake as shown in Figure 2. The hole punching units are stored on the shelves, completely assembled, with the punch and die size indicated on the front of each unit. Interchangeable punches and dies are stored in bins against the wall. Punches and dies are always sharpened, if necessary, before being returned to storage. A four wheel cart, adjusted to the same height as the press brake, is avail-

. . . **continued on page 83**

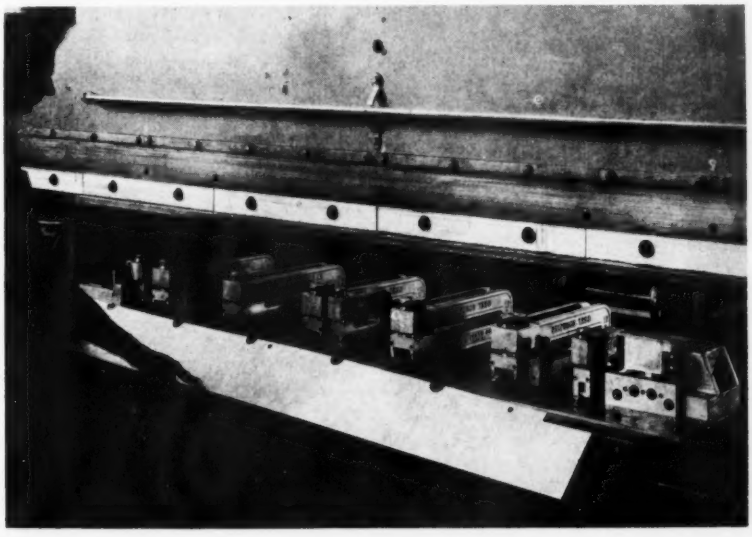


Fig. 3. A good example of the cost savings in multiple perforating and notching as performed here, compared with the previous method of single hole punching.

WEILAND TOOL AND MANUFACTURING CO. GETS

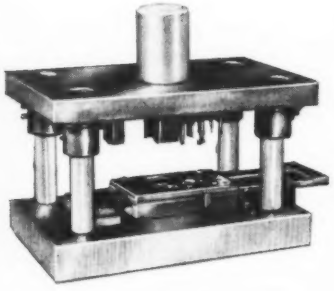
25% MORE PARTS PER GRIND

WITH PRECISION DANLY 4-POST DIE SET

In mid-'59 Weiland Tool and Manufacturing Company of Chicago replaced a worn, 7-station, progressive die to continue production of a standard latch part. The new die was built to identical specifications, except that it was mounted in a 4-post precision Danly die set instead of a 2-post set as previously used.

The number of pieces per die grind produced on the new die far exceeds the output from the earlier identical die. Weiland Tool estimates that, conservatively, 25% longer die life is directly attributable to the extra precision and alignment of the Danly 4-post die set.

Benefits from this longer die life are not limited to a lower per part cost of dies. In addition, Weiland Tool is avoiding considerable downtime for die sharpening and set up, and they are freeing diemakers and set-up men from unnecessary maintenance activities.



Latch handles are stamped out in this 7-station progressive die mounted in a precision Danly 4-post die set.

Here is proof that the finest die set obtainable, is the lowest cost insurance for your expensive dies. May we show you how Danly die set precision can save money for you. Write for the informative folder "The Importance of Die Set Precision."

Branches and Distributor Assembly Plants in all Toolmaking Centers

DANLY

DANLY®

DANLY MACHINE SPECIALTIES, INC. / 2100 SOUTH LARAMIE AVE., CHICAGO 50, ILL.

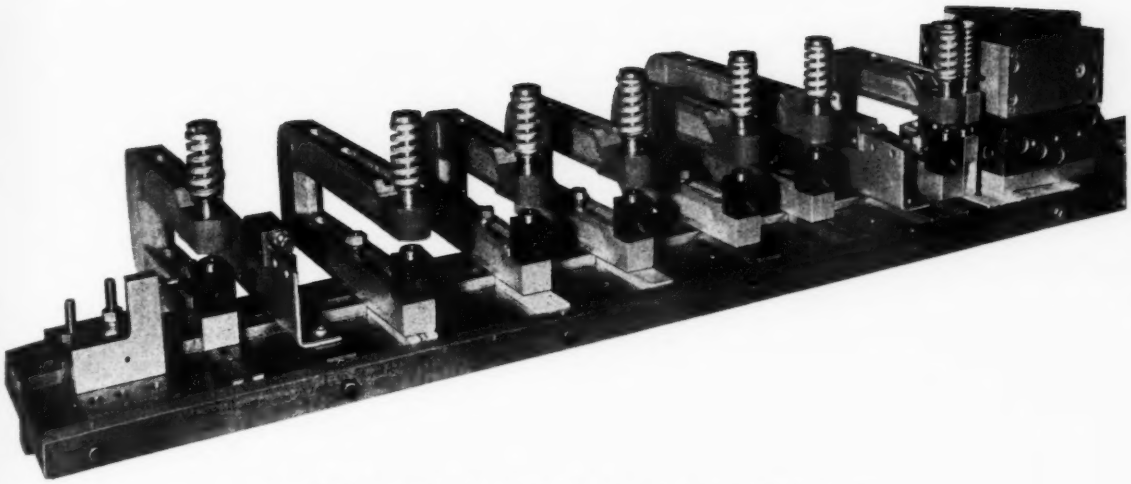


Fig. 4. In those instances when the cost of drilled mounting templates cannot be justified, the Unipunch units are mounted on a bed rail in the press brake.

... Chisholm-Ryder, from page 81 able in press department for assembly and moving of setup. Note the setup on the cart ready to be slid onto the press bed.

Cost savings on the type of part shown in Figure 3 are obvious by comparing the previous method of single hole punching with the multiple perforating and notching operation illustrated. In some instances when the cost of drilled mounting templates cannot be justified, these hole punching units are mounted on a bed rail in the press brake as shown in Figure 4. The units are adjustable front to back as well as right to left and are fastened to the rail by bolts to the T-slots in bed rail.

Forming sheet metal can also be accomplished without removing the bed rail. A slot is provided in the rail for insertion of the tongue of the forming die, Figure 5. Gages for forming are fastened to the two slots along the rear of the rail.

Changeover of press brake from bed rail to wide part hole punching is simple. The bed rail is removed and the upper front angle support fastened into position. The lower angle supports are very seldom removed as they serve as a convenient stock table when not used to support units.

Over-all results in savings on this new tooling program have been greater than most optimistic estimates. Reports on parts that were produced with this revised method show costs reduced from 25 to 75% of previous runs.

Extra copies of this article are available while supply lasts. Write Tooling & Production Magazine, 1975 Lee Road, Cleveland 18.

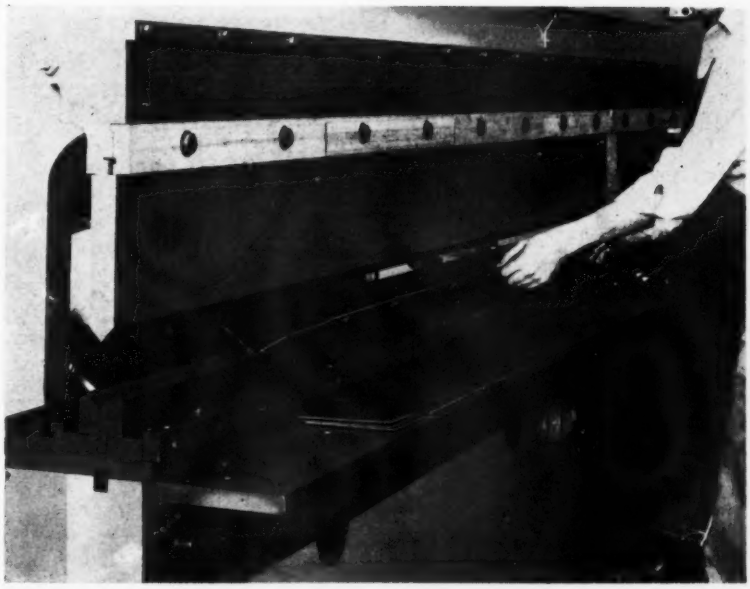


Fig. 5. Forming sheet metal can be accomplished without removing the bed rail. A slot is provided in the rail to take the tongue of the forming die.

Galvanize with Z.R.C.®

to stop RUST and RUST CREEPAGE

apply by brush, spray or dip!

Z.R.C. provides instant, long lasting galvanic protection for all iron and steel surfaces.

It's ready for use right from the container, requires no special surface preparation, mixing or blending, and dries quickly (touch dry in 30 minutes) to form a tough, flexible, firmly adherent coating of 95% zinc. THIS COATING ALONE WILL WITHSTAND OVER 3000 HOURS OF SALT SPRAY TESTING AND PASSES THE PREECE TEST. It may be top coated if decorative painting is necessary. Cost, about 2¢ per sq. ft.

Production—Z.R.C. galvanizing eliminates handling and shipping costs, speeds operations. Maintenance—Z.R.C. sharply reduces annual labor costs. For full details....

the SEALUBE company

WAKEFIELD, MASSACHUSETTS

CIRCLE INFORM-A-GRAM KEY NO. 84

MEN YOU SHOULD KNOW

Appointment of **Charles B. Pickering** as product manager of numerical control systems for **Diehl Manufacturing Co.**, subsidiary of **The Singer Manufacturing Co.**, was announced recently.

Edward E. Sigg has been named vice president for manufacturing of **Mechanical Specialties Company**, Los Angeles.

Herbert T. Florence has been elected president and general manager of **The Cleveland Crane & Engineering Co.**, succeeding **Charles F. Safreed**, who has been made chairman of the board. Also advanced were **William J. Ryan**, who became vice president and assistant general manager; and **Ralph Ford**, who was made assistant secretary.

A. William Tilder is now general manager of the **Morton Machine Works Div'n.**

Roland Hecker is the new chief engineer of **Burg Tool Manufacturing Company, Inc.**

The Cleveland Crane & Engineering Co. engineering executive staff has been enlarged. **Roy Dehn** is now director of engineering; **Chester G. Reed**, chief engineer, crane production; **Franklin W. Dunning**, chief engineer, crane development; **Willard A. York**, chief engineer, Cleveland Tramrail production; **Harry A. Cotesworth**, chief engineer, Cleveland Tramrail development; and **Alfred W. Schultz**, chief engineer, Steelweld Press Div'n.

Richard Hawkins has been named product manager of bronze metals at **Meier Brass & Aluminum Company.**

Leonard J. Lindstrom has been appointed manager of engineering and research of **Despatch Oven Co.**

Victor Frederiksen has been appointed works manager of **Moto-Mower, Inc.**, a subsidiary of **Dura Corporation.**

Louis Polk, Jr., has been appointed vice president of operations of **The Sheffield Corporation**, according to **C. Thorpe Thompson**, vice president and general manager.

New director of engineering at **The Thompson-Ramo-Wooldridge Products Company** is **William S. Aiken**, formerly manager of the project engineering department there.

Rhode Island Spring Products, Inc., has named **Paul J. D. Baltzer** vice president and general mgr.

James E. Heath has been appointed vice president of manufacturing for the **Magnaflux Corp.**

The Hoefer Manufacturing Company has announced that **Emmert A. Timm**, recently appointed general manager, has been elected vice president of the firm.

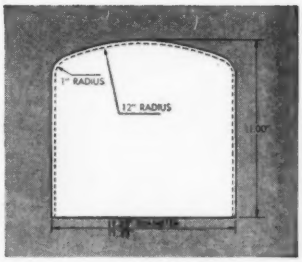
John P. G. Patton has been elected secretary and a member of the board of directors of **The Cleveland Cap Screw Company.**

Election of **Fred P. Hauck** as executive vice president and **Robert C. Dickey** as vice president in charge of manufacturing at **Michigan Abrasive Company**, was announced recently.

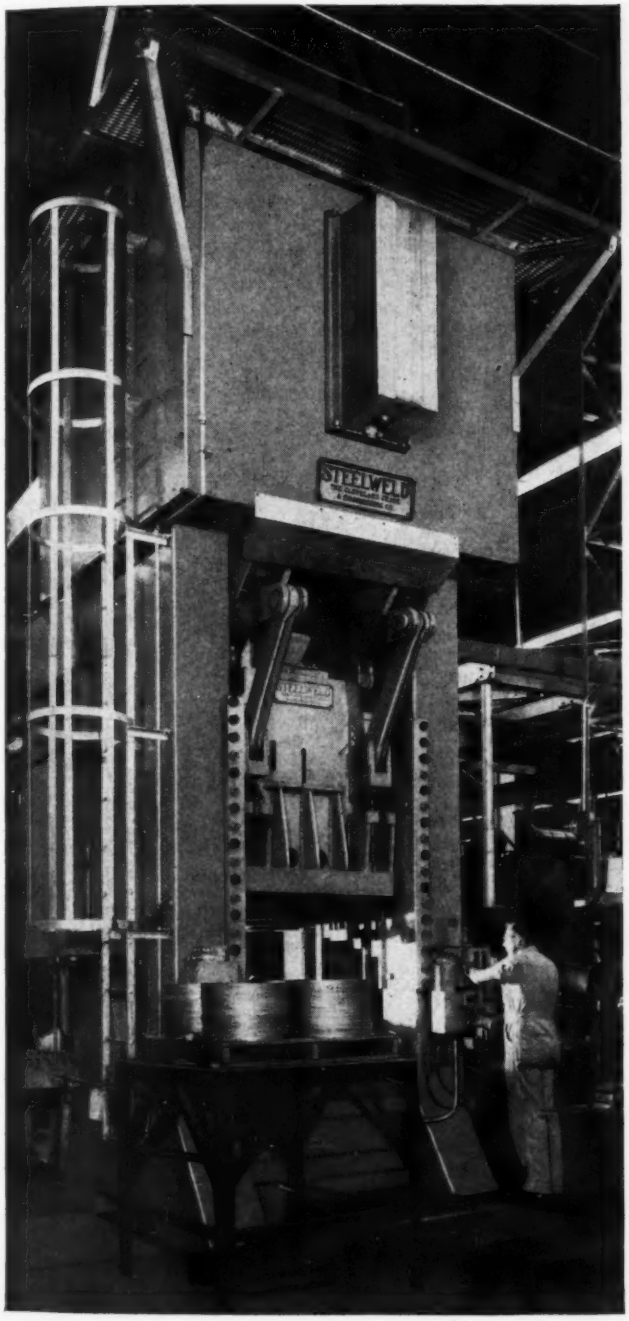
Douglas D. Brien has been named president of the **Ohio Gear Company**, succeeding **Harrison Browning**, who has been named chairman of the board there.

DEEP-DRAWN SHELLS FORMED IN *SINGLE DRAW* ON STEELWELD SPEED-DRAW PRESS

Draw Is Greater than 50% REDUCTION from Blank Size



This shell is stamped in a single draw from a 22¾ inch diameter steel blank. Material is 0.1644" draw-type steel.



Model D1-400-48-54 Steelweld Double-Action Speed-Draw Press rated 400 tons capacity with 48 x 54 inch slide area.

Some of the great number of shells produced daily. All dimensions are held accurately to specifications and the stampings are smooth and uniform.

A new kind of press with unique, patented toggle-eccentric mechanism stamps shells for air-conditioning units in a single draw from 22¾" dia. blanks to dimensions shown in sketch.

The unusual operating principle of the Speed-Draw Press permits making extra long draws at higher speeds than shallow draws can be made on a standard crank-type press. The deep-draw feature frequently reduces the number of operations required to form a part and often permits operations that are not possible on a standard press. Because of these advantages, parts can normally be produced at a far greater speed on a Steelweld Speed-Draw Press.

Write for free catalog No. 2029

STEELWELD

SPEED-DRAW PRESSES

Steelweld Machinery includes: Shears and Press Brakes, One-, Two- and Four-Point Straight-Side Presses, Speed-Draw Presses.

Steelweld Machinery Division • The Cleveland Crane & Engineering Co. • 8703 East 280 Street • Wickliffe, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 85

TECHNICAL BOOKS . .

10-DAY TRIAL OFFER!

10-day examination allowed; returnable for full credit or refund if returned in saleable condition.

HUEBNER PUBLICATIONS, INC.
1975 LEE ROAD, DEPT. E
CLEVELAND 18, OHIO

Gentlemen: Please send books checked.

- ☐ **THE ACCURACY & GEOMETRY OF PRECISION SURFACE PLATES, ANGLES & STRAIGHT EDGES** by E. Willard Pennington. **$ .75**
- ☐ **ADHESIVE BONDING OF METALS** by George Epstein. 1954; 227 pages. Types and strengths of adhesives, joint factors, etc. **$2.95**
- ☐ **BRAZING MANUAL** prepared by the Committee on Brazing and Soldering, American Welding Society. 1955; 208 pages. Practical information on every type of brazing problem, including tables. **$4.75**
- ☐ **COLD FORMING OF STAINLESS STEELS** by Lester F. Spencer. A 28-page pamphlet on the subject. **$1.00**
- ☐ **DIAMOND TECHNOLOGY** by Paul Grodzinski. 784 pages. 93 working tables, and over 486 photographs and drawings. The only standard work on the subject. **$10.00**
- ☐ **DICTIONARY OF METALLURGY** by A. D. Merriman. 400 pages profusely illustrated. 7,000 definitions. 236 tables. **$25.00**
- ☐ **DIE DESIGNING & ESTIMATING**, 4th edition. 363 pages; 26 chapters; over 400 illustrations. A standard reference work. **$7.50**
- ☐ **DIE ESTIMATING** fourth edition. Provides the KNOW-HOW for determining what it takes in units of time to build a die. 62 pages. **$3.00**
- ☐ **ELECTROPLATING ENGINEERING HANDBOOK** edited by A. Kenneth Graham. 1955; 670 pages. Complete engineering fundamentals and processing data on all phases of electroplating. **$10.00**
- ☐ **FASTENERS HANDBOOK** by Julius Soled. 1957; 450 pages. Complete data, illustrations and descriptions covering all currently available industrial fasteners. **$12.50**
- ☐ **GEARS FOR SMALL MECHANISMS** by W. O. Davis. 20 chapters profusely illustrated covering theory, design and practice in cutting and generating gear tooth forms. **$5.00**
- ☐ **HANDBOOK OF BARREL FINISHING** by Ralph F. Enyedy. 1955; 288 pages. Every phase of barrel finishing, including over 150 complete specification sheets and latest development. **$8.25**
- ☐ **HANDBOOK OF LAYOUT & DIMENSIONING FOR PRODUCTION** by Hyman H. Katz. 479 pages. The functional principles of dimensioning in clear, interesting, succinct English. **$15.00**
- ☐ **HOW TO DESIGN & SPECIFY PRINTED CIRCUITS** Reporting on advantages, layouts, design, selection of materials and components etc. **$5.00**
- ☐ **INDUSTRY AGREES ON 'BUILDING BLOCK' STANDARDS** by William E. Hoffman. **$1.00**
- ☐ **INSTRUMENTS FOR MEASUREMENT & CONTROL** by Werner G. Holzbock. 1955; 416 pages. Fully describes, illustrates and compares all current devices for measuring and controlling temperature, moisture, pressure, flow, uniformity, etc. **$10.00**
- ☐ **MACHINING, HEAT TREATMENT & PICKLING OF STAINLESS** by Lester F. Spencer, 36 pages on the working of stainless steel. **$1.50**
- ☐ **MANUAL OF MACHINABILITY AND TOOL EVALUATION** by Antoni Niedzwiedzki. Tool life formulas, tool life criterion, chip load and workpiece hardness, tool geometry, test records, tool inspection, machinability classification, machine tool selection, and much other valuable data including graphs, drawings and recommendations. **$6.00**
- ☐ **MATHEMATICAL PROGRAMMING** by Reinfeld & Vogel. 274 pages. The practical application and use of mathematics in industrial programming. **$8.00**
- ☐ **MICROSTRUCTURES OF DIAMOND SURFACES** by S. Tolansky. 11 chapters of original research. New optical techniques explained. **$8.50**
- ☐ **PLASTICS ENGINEERING HANDBOOK**, compiled by The Society of the Plastics Industry. 850 pages. **$15.00**
- ☐ **THE PRINCIPLES OF INVENTORY MANAGEMENT** by Nyles V. Reinfeld. An authoritative 32-page treatise on the economic aspects of analysis within your existent inventory control system. **$2.00**
- ☐ **PRINCIPLES & METHODS OF SHEET METAL FABRICATING** by George Sachs. 1951; 537 pages. Describes in detail sheet metal forming methods, metallurgical effects in stamping, drawing, extruding, bending; design of parts and dies, etc. **$11.00**
- ☐ **PRODUCTION CONTROL** by Nyles V. Reinfeld. 1959; 340 pages. A practical guide to the principles and functions of production control—details forecasting, scheduling and inventory techniques—incorporates up-to-date research from 500 companies. **$8.00**
- ☐ **PROTECTIVE COATINGS FOR METALS** by Burns and Bradley. 2nd edition. 1955; 657 pages. Latest information on the composition, properties and performance of metallic and organic coatings. **$12.50**
- ☐ **TECHNICAL WRITING MANUAL** by Christian K. Arnold. A glossary of word usage for technical people. **$2.50**
- ☐ **TECHNIQUES OF PRESS-WORKING METAL** by Eary & Reed. 472 pages. 20 chapters and hundreds of drawings cover this subject in highly comprehensive detail. **$12.00**
- ☐ **TREATISE ON MILLING & MILLING MACHINES** by The Cincinnati Milling Machine Co. 896 pages, over 200 formulas and 700 illustrations and charts. **$8.00**

AMOUNT OF ORDER $_____

Open account shipments to rated companies. Otherwise payment with order, please. No C.O.D.s. Ohio customers add 3% sales tax. Quantity prices quoted on request.

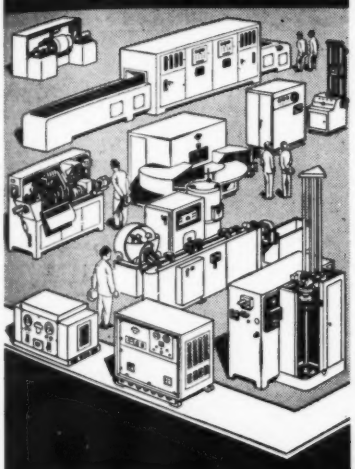
COMPANY _____

CITY _____ **ZONE** _____ **STATE** _____

ADDRESS _____

BY _____ **TITLE** _____

for HARDENING • BRAZING
SOLDERING • FORGING • ANNEALING
MELTING • SINTERING • WELDING
REFINING • SHRINK FITTING
CRYSTAL GROWING



THER-MONIC

Manufactures the most complete range of

INDUCTION HEATING EQUIPMENT

ELECTRONIC • LOW FREQUENCY
MOTOR GENERATOR

THER-MONIC features

• Over 20 years of concentrated experience.

• Over 5,000 installations.

• Over 15,000 heating applications resolved in our customer service laboratories.

• This outstanding experience and know-how qualify us to prescribe the techniques and equipment best suited for your requirement.

Contact our factory or your local IHC representative.

Write for New 56-page catalog of exclusive features, facts and specs.

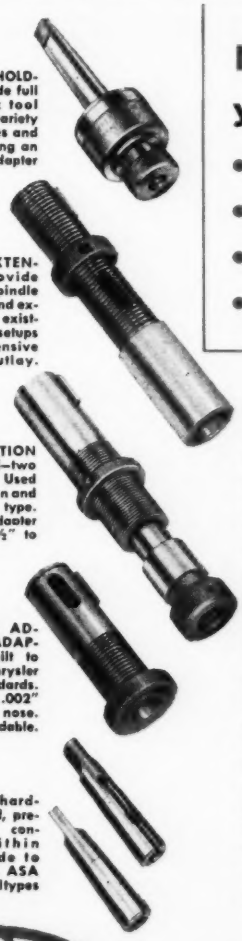
INDUCTION HEATING CORP.
181 WYTHE AVE., BROOKLYN 11, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 871

When you specify SEIBERT

HOLDING TOOLS you get

• ADVANCED DESIGN
• PRECISE WORKMANSHIP
• FINE MATERIALS
• QUICK SERVICE



FLOATING HOLDERS — provide full float, quick tool changes, a variety of shank types and sizes, including an adjustable adapter shank.

SPINDLE EXTENSIONS — provide individual spindle adjustment and extend or alter existing multiple setups without extensive retooling outlay.

DOUBLE-ACTION TAP DRIVERS—two tools in one. Used both as tension and compression type. Made in 6 adapter sizes from ½" to 1⅜".

SHUR-LOCK ADJUSTABLE ADAPTERS — built to GMC, Ford, Chrysler and ASA standards. Concentricity .002" TIR 6" from nose. Sturdy, dependable.

DRIVERS — hardened, ground, precision built, concentric within .002". Made to automotive, ASA standards. All types and sizes.

These are the money-saving advantages of Seibert Production Holding Tools. And because of them, an excellent reputation has been built for these tools in many mass-production plants throughout the country — automobile, truck, tractor, agricultural implement, earth-moving equipment, etc.

In addition these advantages have influenced prominent machine tool builders to specify Seibert Holding Tools when tooling up machines being furnished to mass-production plants. They know from experience that Seibert Tools will meet the most exacting requirements of their customers.

Improved machining and other production methods make possible the quantity manufacture of these production tools to precise tolerances from fine alloy steel without increased cost to the user. In addition, this efficient production provides for meeting the needs of the user with unusual promptness.

You can investigate the advantages of Seibert Tools by telling us your requirements. Complete data will be sent at no obligation to you.

SEIBERT

SEIBERT & SONS, INC. 1012 E. 24th STREET CHENOA, ILLINOIS

Quality MULTIPLE DRILL SPINDLES AND PRODUCTION TOOLS

CIRCLE INFORM-A-GRAM KEY NO. 872

1800 TOOL ROOM NEEDS!

COMPRESSION SPRING ASSORTMENT

Available in many sizes, ranging from 3/32" to 1-1/2" diameter. Made from music wire. All springs 10" long. Select the size required and cut to length wanted. Saves times and money. Extension Spring Assortments also available.

YOU NEED THIS FREE CATALOG

Lists 1800 items needed in every tool room such as plastic ball bearing handles, malleable machine handles, hand wheels, etc. and new revolutionary devices to save time and money and improve appearance of product. Send for this valuable book today.

88 PAGE CATALOG FREE!

REID TOOL SUPPLY COMPANY
MUSKEGON HEIGHTS, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 873

Catalogs and other helpful literature

Fast Metal Removal and ability to take heavy cuts are advantages of the 10″ production lathe introduced in a new bulletin which gives other advantages and specifications. Get Bulletin 641 from Pratt & Whitney Co., Inc., or Circle Inform-A-Gram No. C1.

A Technical Bulletin gives specifications for low inertia, custom made, certified military type fine pitch spur gears. A new stock specification numbering system is also explained. Get Booklet 5 from PIC Design Corp., or Circle Inform-A-Gram No. C2.

Eliminate costly reading errors with the

"HELIOS"
DIAL VERNIER CALIPER with built-in DIAL INDICATOR
Direct Reading in .001″

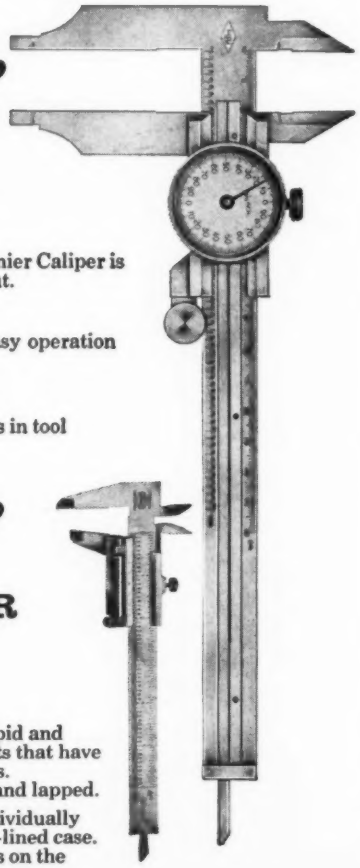
The world famous "HELIOS" Dial Vernier Caliper is hardened, ground and lapped throughout.

Other features:

- Thumb roll permits quick and easy operation
- Knurled lock screw
- 100% measuring capacity (outside, inside and depth.)

Available in 5″, 6″, 8″ and 10″ capacities in tool steel or stainless steel.

Height Gage Attachment optional.



"HELIOS"
SWING-JAW VERNIER CALIPER
with knurled lock screw

- Direct Reading
- Capacity 4¾″
- Length of Jaw 1⅝″

The swinging jaw allows a very easy, rapid and extremely accurate measurement of parts that have faces which do not lie along the same axis. This caliper is stainless steel, hardened and lapped.

Every "HELIOS" Vernier Caliper is individually packaged in a beautiful hardwood velvet-lined case. Write for detailed information and prices on the "HELIOS" Caliper line.

U. S. REPRESENTATIVES:
M. B. I. EXPORT & IMPORT LTD.
A DIVISION OF MACHINERY BUILDERS, INC.
475 Grand Concourse, Bronx 51, N. Y.
"Over 25 years' experience in designing and building machinery."

Power-Operated Ring and circle slitting shears and flanges that improve speed and accuracy in circular cutting and flanging opera-

tions are introduced in a bulletin. They're designed for medium and heavy sheet metal work. Niagara Machine & Tool Works, supplies copies of Bulletin 70G, or Circle Inform-A-Gram No. C3.

Angle Nut Setters for heavy service are presented in a bulletin which lists features and gives ideas for using various attachments. Gardner-Denver Co. supplies Section 16, Page 347, or Circle Inform-A-Gram No. C4.

A Power Press master control bulletin shows how the A3-MC Trippit controls increase production, cut costs, and increase safety. Get a copy from General Automation Corp., or Circle Inform-A-Gram No. C5.

Six Types of Multiple-Spindle Drillheads are highlighted in a 28-page catalog that gives data on fixed center, angular, rotating, single and double eccentric adjustable, and universal joint adjustable types. Get Catalog 2 from Thriftmaster Products Corp., or Circle No. C6.

"Rigidamp" products that combine viscoelastic damping materials with rigid structural materials so as to produce rigid, highly dampened structures, is explained in a bulletin. What it does, how it's used, how it works, and where it's needed are all discussed. Get your copy from Barry Controls Inc., or Circle No. C7.

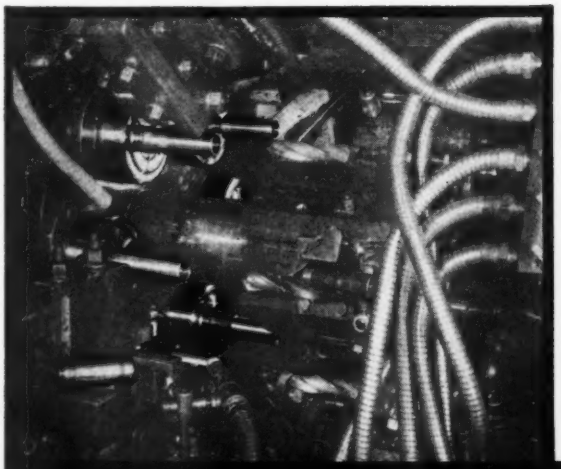
HARDINGE
ELMIRA, N.Y.

When Ordering Automatics

Specify **HARDINGE Style "S" Sure-Grip Master Collets and Pads**

and **HARDINGE Style "B" Master Feed Fingers and Pads**

Photo of Model 601 New Britain Automatic courtesy New Britain-Gridley Machine Division.



Your automatics perform best with HARDINGE Master Feed Fingers and Master Collets. The name HARDINGE is your guarantee of accuracy and durability . . . allows you to reap the full benefit of the inherent accuracy of your machines.

HARDINGE Master Collets are ***the only masters with no work pressure on the screw*** . . . last longer . . . retains accuracy.

HARDINGE Master Feed Fingers and Pads save 30% to 80% over conventional solid feed fingers.

All sizes for all automatics.

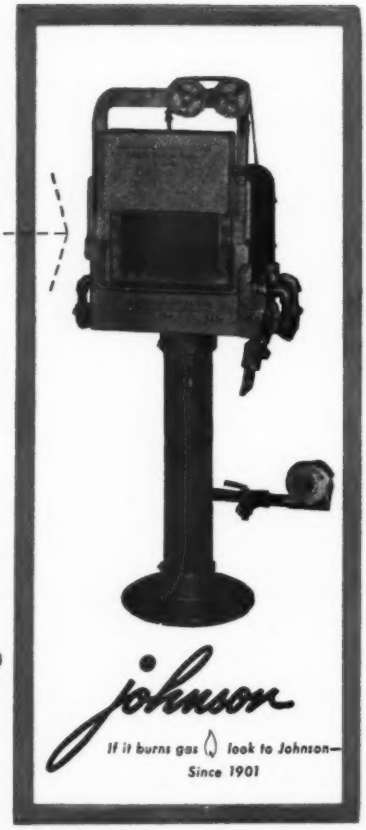
Prompt Delivery from these Stock Locations: Atlanta, Boston, Chicago, Dayton, Detroit, Elmira, Hartford, Los Angeles, New York, Philadelphia, Seattle, Portland, Springfield, N.J., Minneapolis, Oakland, St. Louis, Toronto.

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

CIRCLE INFORM-A-GRAM KEY NO. 89

HEATS FAST SAVES TIME

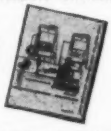


johnson

NO. 142 HEAT TREATING FURNACE

Start heat treating high speed and carbon steels while other furnaces warm up. Powerful burners in this efficient furnace get heat up to 1300°-2350° F. range in minutes. Temperatures accurately and quickly regulated. Ratchet-operated door opens upward — no need to open fully every time. High temperature refractory-lined firebox keeps heat uniform — 7" by 13" by 16½". 200,000 BTU's per hr. Carbofrax hearth, G.E. Motor and Johnson Blower included ..... F.O.B. Factory, $374.00

WRITE TODAY FOR FREE JOHNSON CATALOG



Johnson Gas Appliance Company
575 E AVENUE N.W.,
CEDAR RAPIDS, IOWA

CIRCLE INFORM-A-GRAM KEY NO. 901

New! *ONLY*..... **$15★**

Buys This Compact Mist Coolant Unit

*Complete With Magnetic Nozzle Holder As Shown (In U.S.A.)

Especially designed for small precision machinery used for drilling, tapping, sawing, grinding, etc. Up to 500% savings through increased cutting speeds and tool life. Check these quality features and write for complete details.

- ***compact . . . measures 3" x 5"***
- ***separate air and coolant controls***
- ***convenient mounting stud***
- ***attaches to existing shop airline***
- ***shatter-proof 8 oz. reservoir***
- ***neoprene flexible coolant line***
- ***magnetic nozzle holder positions anywhere***
- ***controlled discharge***

Larger Types and Capacities Available

SEND FOR BULLETIN NO. 37

TRICO FUSE MFG. CO
MILWAUKEE, WIS. U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 903

ALINA SERIES "W" BORE GAGES

Range from .160" to 12"

Alina bore gages are extremely sensitive and designed for trouble-free operation.
The three point centralization system locates the gage in the hole quickly and accurately.
Alina bore gages will swiftly reveal taper, bell mouth, out of round, and other dimensional variations.

A push-button retracts the movable anvil for easy non-scratching insertion into the workpiece. This feature also saves wear on the anvils.

Each gage is equipped with tungsten carbide contact points for lasting on the job accuracy. (except model WO-1).

Bore gages with measuring depths up to 40" delivered on special order.
Model WO-1 available with measuring heads down to .160".

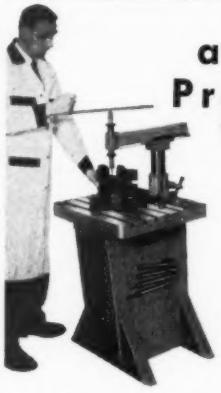
Furnished as a set complete with depth adjustment stops and fitted wooden case.

ALINA **WRITE FOR ILLUSTRATED LITERATURE**

ALINA CORPORATION

122 East Second Street, Mineola, Long Island, New York

CIRCLE INFORM-A-GRAM KEY NO. 902



all-new Producto VERSA TAP

TAP PERFECT HOLES— FAST!

- Rapid positioning over entire table area
- Floating tap finds true hole center
- Produces straight tapped holes

TOOLROOM EQUIPMENT DIVISION
THE PRODUCTO MACHINE COMPANY
945 Housatonic Ave., Bridgeport, Conn.

CIRCLE INFORM-A-GRAM KEY NO. 904

Catalogs . . .

Fluorocarbon Stock Shapes and fabricated parts are discussed in an 8-page bulletin. Complete physical property tables and representative applications for rod, tubing, tape, and sheet are included. Get Bulletin BR-4 from The Polymer Corp. of Pa., or Circle Inform-A-Gram No. C8.

An "Induction Heating Review" features applications, metallurgical aspects, shop hints, and new induction heating equipment. Get this new edition, Vol. 1, No. 7, from Lepel High Frequency Laboratories, Inc., or Circle Inform-A-Gram No. C9.

The Harig Grind-All Fixture for grinding irregular shaped perforators is described in new literature. Features of this latest fixture and information on the radius dresser arm and ball-seat punch adapter are included. Get a copy from Harig Mfg. Corp., or Circle Inform-A-Gram No. C10.

Precision Miniature Drill Jig Bushings, standardized to cut small hole drilling costs, are described in a bulletin. Complete specifications and a chart for quantity discounts are included. Write Prebco Bushing Co. for your copy, or Circle Inform-A-Gram No. C11.

A 40-Page Specification Catalog of air control valves cover inline

2-, 3-, and 4-way valves, sub-base mounted 4-way, and 4-way 5 port valves. Get your copy from Hoffman-Odom Co., or Circle Inform-A-Gram No. C12.

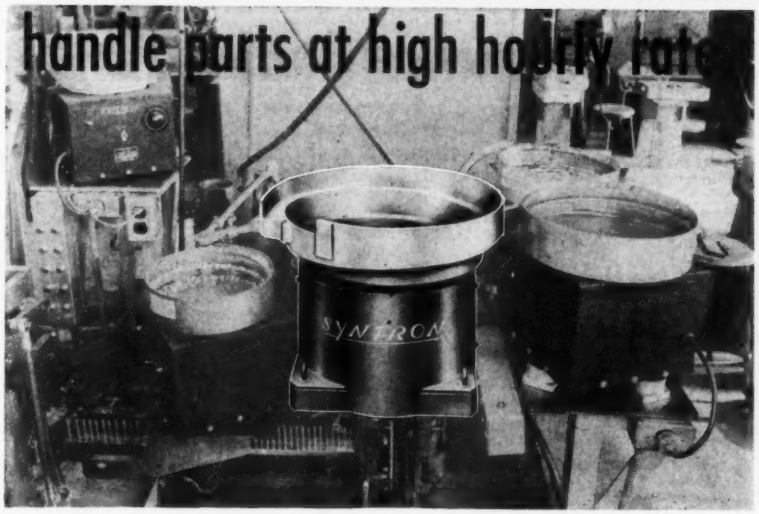
Master Tool Post and toolholders that give greater rigidity cut setup time 50%, and speed machining time 30%, are discussed in a bulletin. Get a copy from Rhucor, or Circle Inform-A-Gram No. C13.

High Production Precision Disc Grinders are offered in a bulletin featuring both horizontal and vertical machines. The condensed catalog is available from Besly-Welles Corp., or Circle Inform-A-Gram No. C14.

An Electrolytic Supply Unit line is described in a bulletin which gives data on three models ranging from 50 to 3000 amperes. Bulletin 126 is available from Anocut Engineering Co., or Circle Inform-A-Gram No. C15.

Over 65 Individual Models of readers and magnifiers are listed in a booklet. Specifications and prices are given for 2 to 20 powers. Get Catalog I-103 from Bausch & Lomb Inc., or Circle No. C16.

SYNTRON cost-reducing equipment of proven dependability



SYNTRON Vertical Vibratory
PARTS FEEDERS

. . . replace manual methods of handling small parts . . . handle parts of almost every size, shape and material at high instantly controlled rates to tapping, counting, inspecting, tooling, centerless grinding, stamping machines, and other operations.

SYNTRON Parts Feeders offer dependable, high count, single file feeding of parts. Designed for efficient, dependable service with little or no maintenance.

Write for free literature on SYNTRON Parts Feeders

SYNTRON COMPANY
341 Lexington Ave. Homer City, Penna.

Other SYNTRON Equipment of proven dependable Quality

BATTERY CHARGERS

BIN VIBRATORS

VIBRATORY FEEDERS

CIRCLE INFORM-A-GRAM KEY NO. 91

CROBLOX® GAGE BLOCKS pioneered by and produced only in the Webber Laboratory

Made of sintered solid chromium carbide, one of the hardest metallic substances known. No case hardened alloys. Practically wear proof. CROBLOX retain their accuracy up to 70 times longer than steel. 30 times more corrosion resistant than 18-8 stainless steel. Insures manufacturers of precision products against dimensional inaccuracies due to gage block wear. Now available in fractional millionths accuracies, CROBLOX—an exclusive WEBBER product, meets the fantastic requirements of the space age. CROBLOX WILL SAVE YOU MONEY.

Please write for descriptive folder.

Both rectangular and square types—
88, 85, 84, 81, 36, 33.
Individual blocks of all standard and special sizes.
Grade A+, accuracies +.000004" and —.000002"
Grade AA, accuracy +—.000002"
LABORATORY MASTERS, accuracy .000001"
Special sets calibrated by the WEBBER method of arithmetical division for the highest type of scientific work.
Accuracy of Calibration .0000002"

Webber GAGE COMPANY 12903 Triskett Rd. Cleveland 11, Ohio

Catalogs . . .

"Handbook of the Alloyist" pinpoints the advantages of several groups of alloys used (phosphor bronze, nickel alloys, monels, and stainless steels) in the electrical and electronics industries. Properties and applications of each alloy are included. Write Riverside-Alloy Metal Div'n, H. K. Porter Co., Inc., or Circle No. C17.

Desired Wheel Characteristics necessary for efficient disc grinding production are listed, and case histories are given for grinding different products, in a new brochure. Get a copy from Macklin Co., or Circle No. C18.

Adjustable Roller Burnishing Tools are offered in a new bulletin that lists tool sizes and specifications. Information on preparing parts for roller burnishing is also included. Bulletin RB-17 is available from The Gustav Wiedeke Co., or Circle No. C19.

Abrasive Finishing of Die Cast and rolled zinc are covered in a technical bulletin. Polishing wheel speeds, types of buffs, and recommended abrasive compounds are included. Write The Lea Mfg. Co. for a copy, or Circle Inform-A-Gram No. C20.

Brush-Backed Polishing heads for sanding, polishing, deburring, and other finishing jobs are featured in a bulletin. Applications of the 12, 16, and 32 brush heads are outlined. Get Bulletin 114 from Grinding & Polishing Machinery Corp., or Circle No. C21.

For Burring, Finishing, and polishing operations, use the wheels, discs, rods, and blocks made with the soft rubber binder that cushions the abrasive. A bulletin describes uses, speeds, and recommendations. Get a copy from Brightboy Industrial Div'n, Weldon Roberts Co., or Circle Inform-A-Gram No. C22.

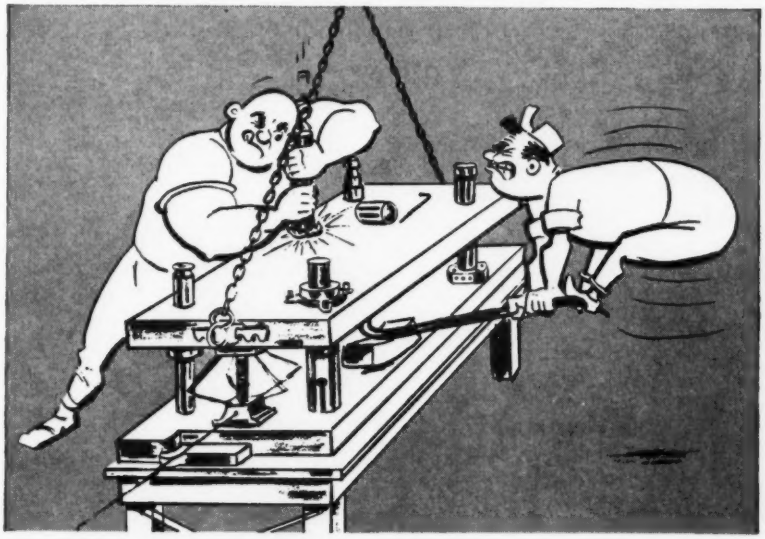
Lapping Techniques, laps, lapping tools, and lapping machines are covered in a bulletin. Techniques for both production and short run lapping are included. Get bulletin from American Lap Co., or Circle Inform-A-Gram No. C23.

Seven Vibratory Machines are described in a bulletin that shows stampings, castings, forgings, and machined parts finished by these machines 10 to 100 times faster. Get a copy from Almco, Queen Product Div'n, or Circle Inform-A-Gram No. C24.

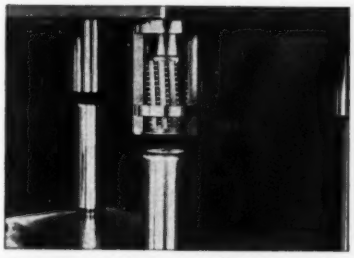
For Cold Heading Die Applications, use the UHB 19-VA tool steel, described in a new bulletin. Detailed data on forging, stress relieving, hardening, tempering, annealing, and grinding is given. Get a copy from The Uddeholm Co. of America, Inc., or Circle No. C25.

The TransfeRobot and the concept of flexible and versatile automation equipment for assembly and machine operation is explained in literature from Robodyne Div'n of U.S. Industries, Inc. The simple means of programming and setup which permits it to be switched from job to job in a half hour is discussed. Get a copy from the company, or Circle No. C26.

DON'T KNOCK YOURSELF OUT WITH STICKY DIE SETS!



Dieco Ball Bearing Die Sets take all the strain out of die making!



NO PAIN... NO STRAIN... and it is extremely accurate! These precision die sets give you burr-free parts and longer production runs — thanks to their "negative clearance." (Cutaway shows how ball-bearing bushing rides on the pin.)

Try a Dieco ball-bearing die set on that next job; you will actually see the punch holder g-l-i-d-e on and off. Folks tell us working with Dieco is almost like taking a two-week vacation. It's that easy.

Management likes them, too. The pre-loaded bushing eliminates die shifting, protects the dies, and gives longer runs between grinds. These sets are assembled in the conventional way; pins are in the shoes. We will sell you complete sets, or just the components, so you can convert the friction bushing sets you now have.

dieco DIE SETS

E. W. BLISS COMPANY
DIE SUPPLY DIVISION
1400 Brookpark Road
Cleveland, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 93

Catalogs . . .

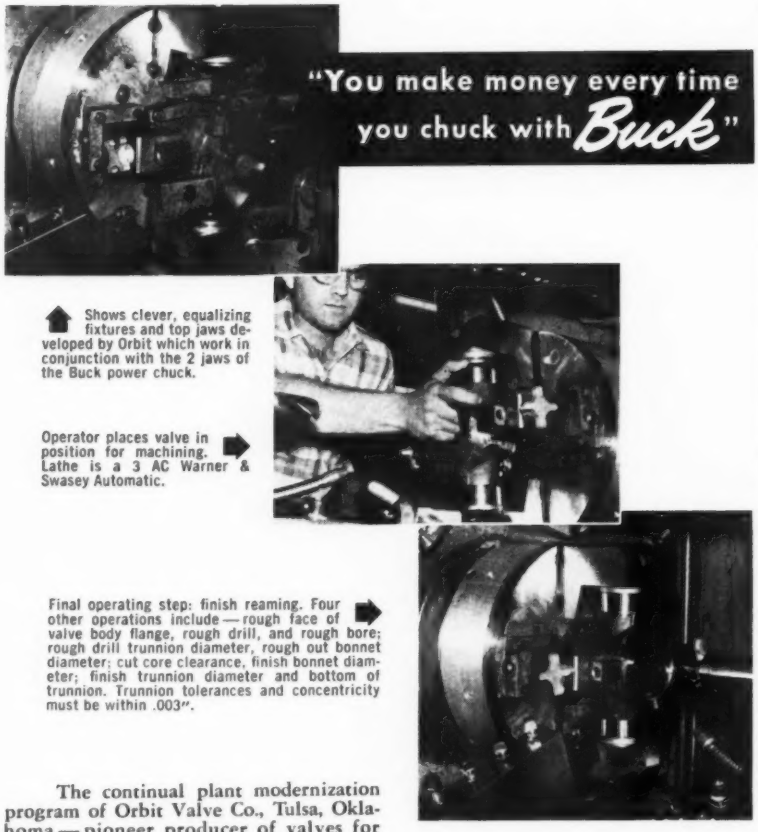
A Heat-Transfer Oil available from Sun Oil Co. is described in a bulletin which gives information on properties and advantages. Write for Bulletin 53, or Circle Inform-A-Gram No. C27.

A Special Tap Price List includes machine screw sizes from #0 to 14 and in fraction sizes from ¼" to 1" Get a copy from Sossner Tap & Tool Corp., or Circle No. C28.

A Weight Calculator for strip steels is available from Uddeholm Co. of America. Markings are in

the metric and American inch-pound system for weight, length, width, thickness, and BWG. Get one from the company, or Circle Inform-A-Gram No. C29.

Orbit Valve, Tulsa, proves it again:



Shows clever, equalizing fixtures and top jaws developed by Orbit which work in conjunction with the 2 jaws of the Buck power chuck.

Operator places valve in position for machining. Lathe is a 3 AC Warner & Swasey Automatic.

Final operating step: finish reaming. Four other operations include — rough face of valve body flange, rough drill, and rough bore; rough drill trunnion diameter, rough out bonnet diameter; cut core clearance, finish bonnet diameter; finish trunnion diameter and bottom of trunnion. Trunnion tolerances and concentricity must be within .003".

The continual plant modernization program of Orbit Valve Co., Tulsa, Oklahoma — pioneer producer of valves for handling petroleum and petrochemicals — resulted recently in saving 18 hours a week on valve body production.

The major change was from hand turret lathe operation to automatics, using the Buck Aluminum body power chuck. It could be done because of the Buck precision capabilities.

Future expected improvements are a 10% increase in production, major time-savings on a former true-up operation, and consistent quality that will reduce inspection time.

The Buck Ajust-Tru® principle guarantees precision within .001" on automatics, and provides many other distinct advantages. Send for a catalog. See why "It pays to chuck with Buck."

Makers of Scroll, Power, Dust Proof, Independent Chucks.

BUCK TOOL COMPANY

1018 SCHIPPERS LANE • KALAMAZOO, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 94

Height Gages, Verniers, Micrometers, plus special size taps and reamers are included in a 96-page catalog published by Ash & Co. Get a free copy by circling Inform-A-Gram No. C30.

Sheet Polishing Mills for finishing metal sheets, plates, and coils are highlighted in a new catalog. Typical applications, construction, operation, and specifications are given in Catalog AM-3 from Acme Mfg. Co., or Circle Inform-A-Gram No. C31.

"Cures for Catastrophic Failures" are detailed in an emergency report that gives specific recommendations for the elimination of hydrogen embrittlement of cadmium plated fasteners. Write Standard Pressed Steel Co. for a copy, or Circle No. C32.

A 24-Page Catalog describes Verson mechanical and hydraulic presses and press brakes, hydraulic shears, press and press brake tooling, and special machinery. Contact Verson Allsteel Press Co. for Catalog 6-60, or Circle Inform-A-Gram No. C33.

Barrel Tumbling Equipment for finishing and definning plastic and metal parts "dry" is described in a new catalog sheet (LS Type). Get a copy from Tumb-L-Matic, Inc., or Circle No. C34.

Hex and Hex Screws, carriage bolts, and lag screws are described in a bulletin that gives dimensional

data, photographs, and drawings of these items. Get a copy from Standard Screw Co., or Circle Inform-A-Gram No. C35.

NEW Machine! NEW Blades! NEW higher productivity!

NEW SAW BANDS
FOR USE ON THE
DoALL CONTINENTAL PRODUCTION SAW

TUNGSTEN CARBIDE
Another DoALL first! Fantastic productivity—cuts twice as much, twice as fast . . . lasts twice as long as any other.

Imperial Every tooth sharpened on all surfaces just like those of a milling cutter and every band can be resharpened for utmost economy.

OTHER NEW SAW BANDS IN DoALL'S GALAXY OF ULTRA-MODERN BLADES

Super Demon An improved type of high-speed steel band gives 30 per cent more cutting for only 10 per cent greater cost.

Demon The original high-speed steel saw band developed by DoALL still outperforms all other blades in its class.

Dart DoALL's new-type carbon steel saw band . . . guaranteed to outperform any other carbon steel blade.

Call your nearby DoALL Sales-Service Store for details. Ask to see the new movie of the CONTINENTAL Production Saw in action.

DoALL
ANNOUNCES THE
CONTINENTAL PRODUCTION SAW

Here's another DoALL breakthrough in metal sawing: tomorrow's machine and tomorrow's blades—today! This new high-production team easily cuts mild steel at rates up to 25 sq. in. per minute and less machinable alloys more efficiently than ever before. Built for continuous, heavy-duty work to bring you tremendous savings in time and cost.

NEW DESIGN—Clean, functional styling. Control station at comfortable working height. Straightforward, heavy-duty construction.

NEW ACCURACY—Programmed index system offers micrometer accuracy on every cut. Servo-controlled constant-pressure vertical feed accurately regulates the cutting rate.

NEW FEATURES—New 10 hp hydraulic drive provides infinitely variable band speeds, 15 to 400 fpm. New vise arrangement permits 2½-in. minimum stub ends in automatic operation. High-pressure coolant piped directly to cutting area *through* the guides, which are hydraulically actuated, self-adjusting, zero-clearance, carbide-faced. Automatic chip discharge auger delivers dry chips to full-size waste can.

PS-17

Find Your DoALL STORE In The "Yellow Pages"

This is a typical DoALL Store

The DoALL Company, Des Plaines, Illinois

Call Your DoALL Sales-Service Store

CIRCLE INFORM-A-GRAM KEY NO. 95

Metallurgical Memo from General Electric

"MOVING METAL"
with Carboloy® cemented carbides
cuts manufacturing costs 3 ways

Saves machining time

Wrist-pin production increased to 2,000 per hour with Carboloy cemented carbides. Used in extruding and coining punches, higher quality General Electric carbides turn out greater quantities in less time at lower cost-per-piece. No machining (except finish grind).

Reduces metal waste

This cold extrusion punch—made of G-E Carboloy carbide results in minimum metal waste in the production of bearings. From one steel slug, this solid carbide punch forms a race and a cup; saves machining costs.

Lowers tooling cost

Rolls of Carboloy cemented carbides last many times longer than steel rolls, will handle tougher materials, result in more uniform product. This means one thing: *Lower tooling costs.* Save on time, roll replacement; improve strip quality.

For specific "moving metal" information, as it applies to your operation, write: *Metallurgical Products Department of General Electric Company, 11111 E. 8 Mile Ave., Detroit 32, Michigan.*

METALLURGICAL PRODUCTS DEPARTMENT

GENERAL ELECTRIC

CARBOLOY® CEMENTED CARBIDES • MAN-MADE DIAMONDS
MAGNETIC MATERIALS • THERMISTORS • THYRITE® • VACUUM-MELTED ALLOYS

CARBOLOY.
CEMENTED CARBIDES

CIRCLE INFORM-A-GRAM KEY NO. 96

Catalogs . . .

Data on Environmental Testing and other applications for controlled atmospheric conditions is the subject of a new 32-page brochure offered by Webber Mfg. Co., Inc. Atmosphere, temperature, and humidity charts are included. Get Brochure 600, or Circle No. C36.

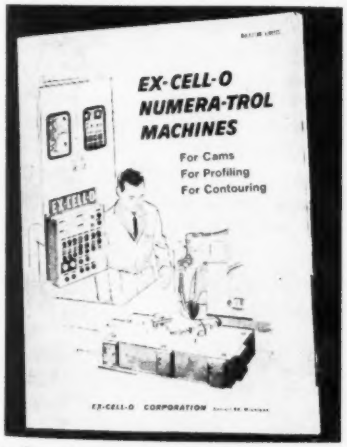
Ultrasonic Flaw Detection is the subject of the new bulletin which includes techniques and a complete list of specifications for the Sonoray 5 flaw detector. Write to Branson Instruments, Inc., for a copy of Bulletin T200, or Circle No. C37.

A Copper or Brass Hammers bulletin gives tables that show weights, lengths, and types available. Engineering drawings show the built-in safety factors. Get a copy from The Hackett Brass Foundry Co., or Circle Inform-A-Gram No. C38.

Mist Coolant Application tips are given in a new booklet. Methods for a variety of standard machining operations are explained. Get the Spraymist bulletin from Bijur Lubricating Corp., or Circle Inform-A-Gram No. C39.

Four Mechanical Deburring Methods are detailed in a folder from Wheelabrator Corp. Diagrams and numerous applications are included. Get a copy from the Company, or Circle No. C40.

Numerically-Controlled equipment for cam production, profiling



and contouring is listed in a new 12-page booklet issued by Ex-Cell-O Corp. It's yours free if you circle Inform-A-Gram No. C41.

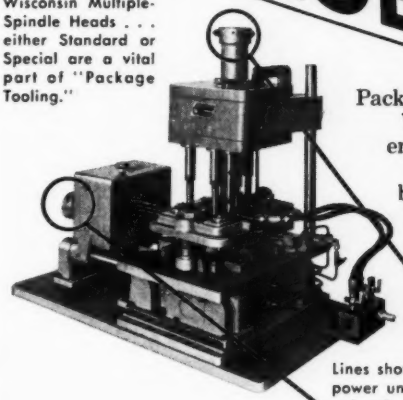
A 32-Page Booklet solves such problems as Excessive scrap losses, die damage, and machine repairs caused by multiple heading in press stamping operations. They can be eliminated with installation of a proximity die saver switch described in the booklet. Get a copy from Robotron Corp., or Circle No. C42.

A Ductile Permanent Magnet Alloy, Cunife, is described in a bulletin which lists properties and shows how it can be stamped and machined into a wide variety of intricate shapes. Write Hoskins Mfg. Co. for a copy of this bulletin, or Circle No. C43.

Diamond Wheels and Tools are featured in a bulletin from Delta Diamond Wheel Corp. The 32-page catalog gives specifications for wheels of man-made or natural diamonds. Both old and new wheel designations are given. Get Catalog 720 from Delta, or Circle Inform-A-Gram No. C44.

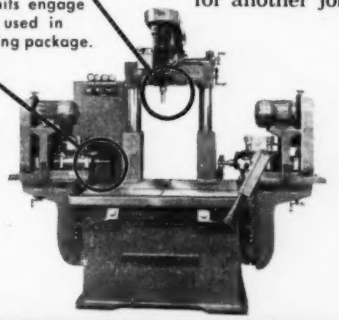
ONE
Wis-Matic does the jobs of
SEVERAL special machines
thanks to . . .
PACKAGE TOOLING

Wisconsin Multiple-Spindle Heads . . . either Standard or Special are a vital part of "Package Tooling."



Package Tooling . . . as developed by Wisconsin for the WIS-MATIC . . . enables this machine to do a variety of drilling, tapping, reaming and boring jobs *in a single* work cycle. Each "package" . . . a complete unit mounted to a base plate, and equipped with multiple-spindle heads . . . may be quickly, securely and accurately replaced by a similar "package" for another job.

Lines show where power units engage heads used in tooling package.



Wis-Matic Machines are available with any combination of *one vertical* and *two, three or four horizontal* power units. As many "Tooling Packages" as required are built for each machine.

Write for Bulletin No. 560

WISCONSIN DRILL HEAD CO.

4975 NORTH 124th ST. • BUTLER, WISCONSIN

CIRCLE INFORM-A-GRAM KEY NO. 97

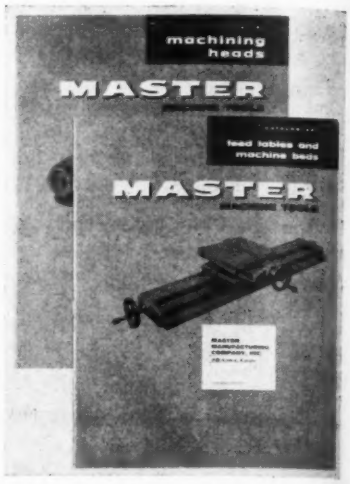
Catalogs . . .

The Coiling and Forming versatility and operational ease of the Curvit C-155 cold metal forming machine are described in a new bulletin. Flanging and programming attachments are also included. Get a copy from Maclodyne Corp., Curvit Div'n, or Circle Inform-A-Gram No. C45.

LogEtronics for superior photodrawings and outstanding savings is described in a bulletin. Assembly drawings, instruction manual illustrations, design modifications, and maintenance instructions are discussed. Get Bulletin B-10M3 from Photodrawing Group, LogEtronics, Inc., or Circle No. C46.

New Layout and Setup Blocks, or welded platens, are described in a new bulletin from Acorn Iron & Supply Co. Models range from 2'6" x 5' to 3'6" x 10'. Get a copy from the company, or Circle No. C47.

Two New Catalogs, Nos. 160 and 260, are entitled "Machining Heads" and "Feed Tables and Machine Beds," respectively, by Master Mfg. Co. Both are full of styles and specs pertinent to erector type machine tools. For copies, Circle Inform-A-Gram No. C48.



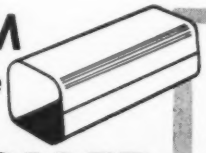
Two New Quenching Oils are discussed in a technical bulletin that contains data on Sunquench 1070 fast-quench oil and Sunquench 1021, a hot oil type of quenching medium. Get Bulletin 61 from Sun Oil Co., or Circle Inform-A-Gram No. C49.

A Precision Casting Technique, The Shaw Process, is completely explained in a booklet. This method produces large metallic products with higher strength and closer dimensional tolerances than before. For your copy, write Shaw Process Development Corp., or Circle Inform-A-Gram No. C50.

Soft Blank Top Jaws are featured in a bulletin from The Cushman Chuck Co. Dimensions for the tongue and groove type, American standard master jaws, standard and extra high type, and the long pointed type are given. Get Bulletin 20A, or Circle Inform-A-Gram No. C51.

A Magnifying Comparator for the measurement and comparison of miniature parts and assemblies is described in a bulletin. Data on five new reticles (transparent scales) is also included. Write Finescale Co. for a copy, or Circle Inform-A-Gram No. C52.

HOW TO FORM
a rectangular shape
with the
DI-ACRO ROLLER



Forming small and large circles without flat spots and a variety of other sheet metal shapes is easily accomplished on the Di-Acro Roller with its *exclusive cam actuated Idler Roll.* Rear roll indicators allow operator to quickly return to a previous setting. Eight models from 6" to 42" forming width.

NEW DI-ACRO POWER ROLLERS

Increase speed and efficiency. Forward, stop and reverse are governed by foot control leaving both hands free for feeding materials. Six sizes from 12" to 42" wide all with 2" ground and polished forming rolls.

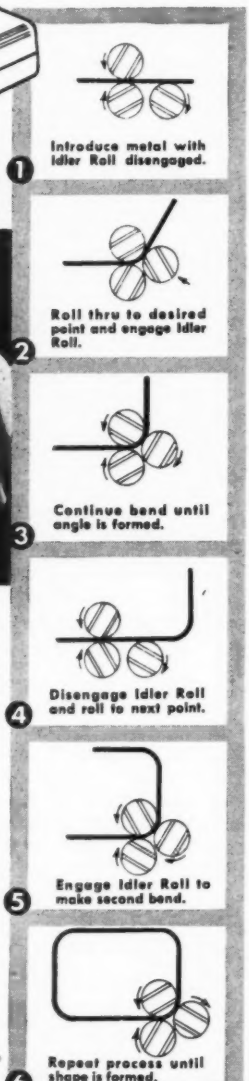
For six page roller folder call your nearest Di-Acro dealer listed in the yellow pages under Machinery—Machine Tools or write to us.

pronounced *die-ack-ro*

Find Us Fast in The Yellow Pages

di-acro PRECISION METALWORKING MACHINES

O'NEIL-IRWIN MFG. CO.
355 8th Avenue • Lake City, Minn.


Introduce metal with Idler Roll disengaged.
1
Roll thru to desired point and engage Idler Roll.
2
Continue bend until angle is formed.
3
Disengage Idler Roll and roll to next point.
4
Engage Idler Roll to make second bend.
5
Repeat process until shape is formed.
6

CONTRACT SERVICES DIRECTORY

Listings, $12.00 per inch ($1.50 per 1/8 inch) Minimum charge, $4.50 per insertion. Rates net.

Michigan

DAVIS TOOL and ENGINEERING CO.
19250 Plymouth Road, Detroit, Michigan, VErmont 5-6000. Tools and Dies, Special Machinery, Sheet Metal Stampings and Assemblies.

Ohio

CLEVELAND UNIVERSAL JIG COMPANY
13404 St. Clair Ave. Cleveland, Ohio
MU 1-2600
DESIGNERS AND BUILDERS
Jigs and Fixtures Special Machines
Production Engineering
Complete Plant Routing and Tooling

Wire Forms: Racks, Wire Assemblies:
Made to Specifications
LOW PRICES: WRITE
Fasform Wire Division
8125 Carnegie Ave., Cleveland 3, Ohio

THE INDUSTRIAL MACHINE CO.
1436 East 47th St., Cleveland, Ohio. Founded in 1908. Builders of Special Machinery. General Machine Work.

KIFFER TOOL & DIE CO.
5601 Tillman Avenue, Cleveland, Ohio, WOodbine 1-2440 & 1-2441. Manufacturers of Special Machinery, Tools, Dies, Jigs, Fixtures, Swiss Jig Boring.

NOBLE & STANTON, INC.
998 Broadway, Bedford, Ohio. BEdford 2-2800. Tooling, Short Run Production and Machined Parts for Automation.

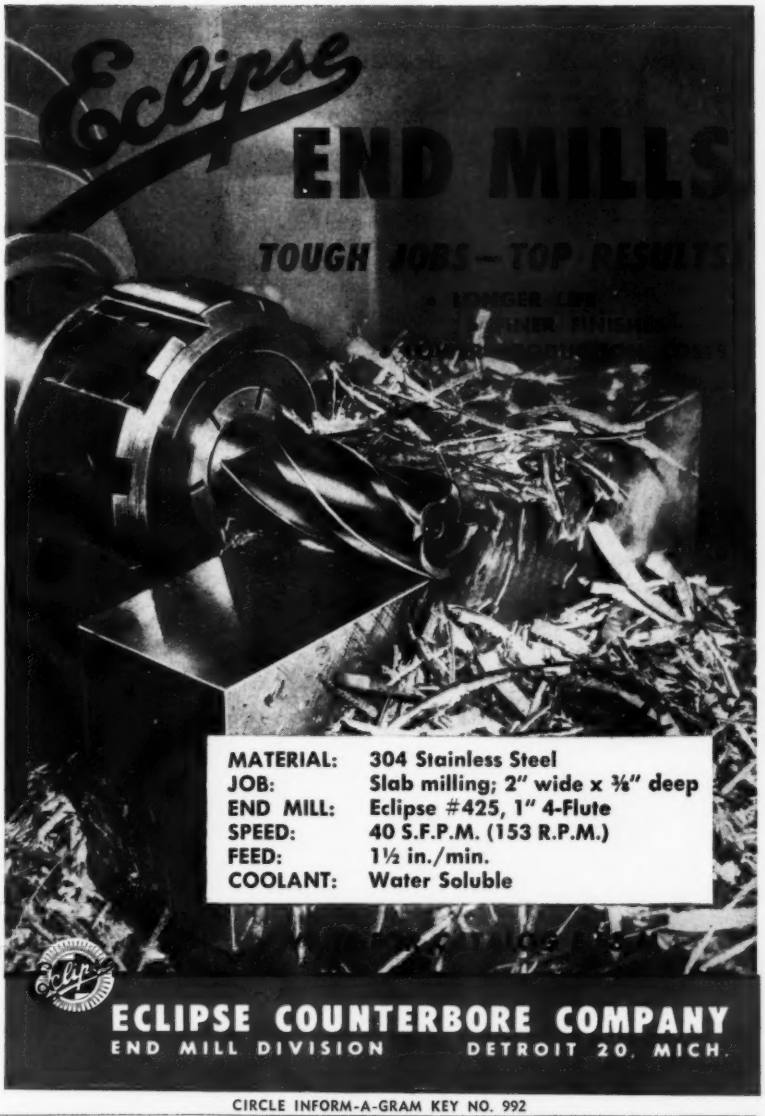
Pennsylvania

Do not scrap dull files. Let us resharpen and save up to 90%. Our BBF Precision Grinding (BBFPG) resharpens dull files to new file efficiency. Any length, shape or cut. Guaranteed. Results will warrant continued patronage.
B. B. FELDENFELD CO.
est. 1939
Factory: Beaver Falls, Pa.
Office: 446 NE 75th St., Miami, Fla.
Salesmen wanted. All territories open. Repeats.

CAMS ALL TYPES MADE TO YOUR SPECS

"Cam Calculating Service"
Dr. Chas. Eisler ME, Founder
Chas. Eisler, Jr., Pres.
EISLER ENGINEERING CO., INC.
712 SO. 13TH ST. NEWARK 3, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 991



MATERIAL:	304 Stainless Steel
JOB:	Slab milling; 2" wide x ⅜" deep
END MILL:	Eclipse #425, 1" 4-Flute
SPEED:	40 S.F.P.M. (153 R.P.M.)
FEED:	1½ in./min.
COOLANT:	Water Soluble

ECLIPSE COUNTERBORE COMPANY
END MILL DIVISION DETROIT 20, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 992

GRIND-DEBURR-POLISH
Faster and Easier with a
DREMEL MOTO-TOOL

No other grinder, regardless of size, power, or price can take the place of the Dremel Moto-Tool. It's lightweight (16 ounces) and handles like a pencil. Gives the operator extreme accuracy for close-tolerance work—and easy operation in tight places impossible to reach with large grinders. The Moto-Tool's high speed (27000 RPM) makes it ideal for use with small mounted wheel points. It's also handy for production deburring, and a perfect size and weight for women operators.

The Dremel Moto-Tool is an indispensable, all-purpose grinder for the tool room—a time-saver for the production line—an industrial favorite since 1936.

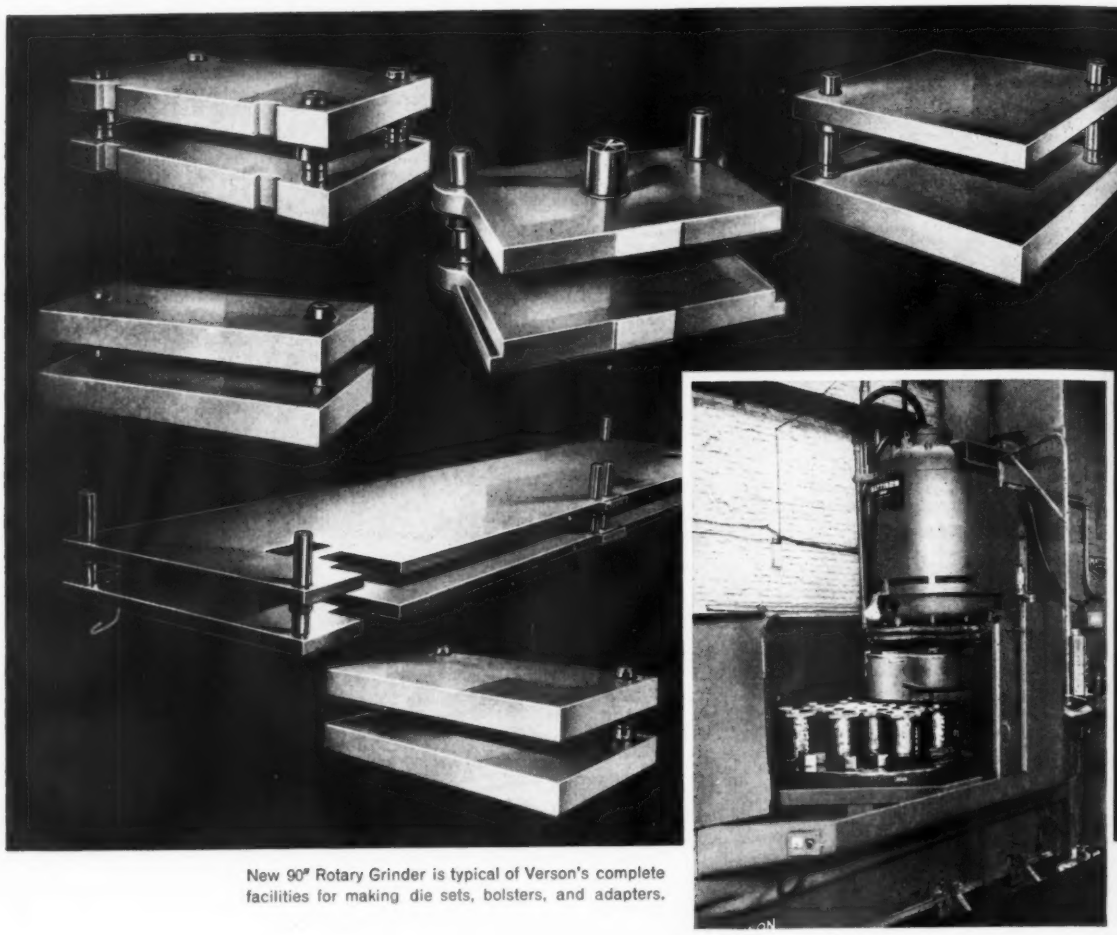
Order from Your Supplier or Write for Tool Catalog

Model No. 2 Moto-Tool only .. **$19.95**
Model No. 2 Moto-Tool Kit with 23 accessories and storage case .. **$27.50**

DREMEL MFG. CO., Dept. 520-K, Racine, Wisconsin

CIRCLE INFORM-A-GRAM KEY NO. 993

MAKE VERSON YOUR SOURCE FOR DIE SETS



New 90" Rotary Grinder is typical of Verson's complete facilities for making die sets, bolsters, and adapters.

Complete fabricating facilities make VERSON DIE SETS more economical, more profitable for you

Now you can take full advantage of Verson's experience and unmatched fabricating and machining facilities the next time you invest in die sets.

Combine the real economy of precise tooling with your longest production runs. Verson's complete stock of roll steel can provide die sets of any size, shape or special machining. You get what you need when you get Verson Die Sets and Bolsters.

245

Verson

Originators and pioneers of allsteel stamping press construction

VERSON ALLSTEEL PRESS CO.

9335 S. Kenwood Avenue, Chicago 19, Illinois • 8300 S. Central Expressway, Dallas, Texas

MANUFACTURERS OF MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES

TRANSMAT PRESSES • IMPACT MACHINING PRESSES • TOOLING • DIE CUSHIONS • VERSON-WHEELON HYDRAULIC PRESSES • HYDRAULIC SHEARS

CIRCLE INFORM-A-GRAM KEY NO. 100

Catalogs . . .

Users of Non-Ferrous and stainless steel mill products will want the 290-page catalog compiled by Meier Brass & Aluminum Co. It

includes latest government and society specs, plus tolerances and material properties in each index-tabbed product section. It's free if you circle No. C53.

Increasing Efficiency and productivity with sound control is illustrated in a 12-page catalog from Allied Witan Co. Charts show flow rates and operating specifications for the various mufflers. Get a copy of "Sound Control" from the company, or Circle Inform-A-Gram No. C54.

A Dressing Tool that eliminates taper, controls size, and easily performs the most difficult form and radius dresses on abrasive wheels is presented in a bulletin. Write Tandemite for your copy, or Circle Inform-A-Gram No. C55.

A 50-Page Catalog covers the latest features and new models added to the Steelweld press line. Specifications cover 160 to 1250 ton capacity presses. Write The Cleveland Crane & Engineering Co. for Catalog 2023-B, or Circle No. C56.

An Alloy Steel Band-Saw Blade specification sheet shows blade widths, gauges, choice of teeth per inch, tooth styles, and types of set. Contact American Saw & Mfg. Co. for Bulletin 1601A, or Circle Inform-A-Gram No. C57.

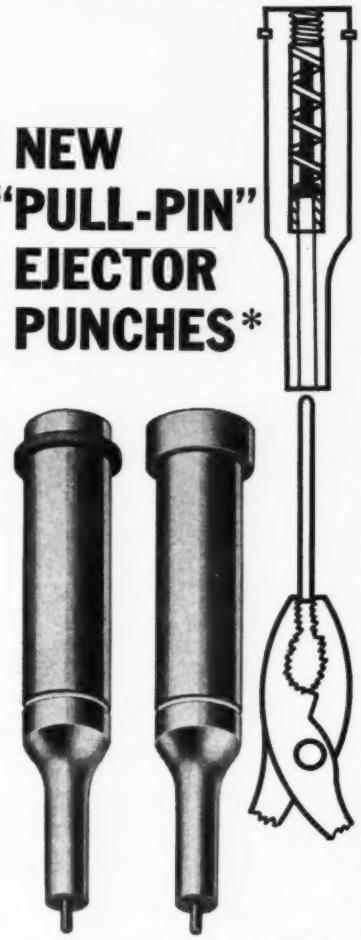
"How to Machine Glass Base Laminates" describes the techniques for fabricating these versatile plastic materials. Tooling needs and recommended setup procedures are discussed. Get a copy from National Vulcanized Fibre Co., or Circle No. C58.

Automation Components and entire assembly machines and their special purposes are explained in a 46-page catalog from Precision Detroit Co. Index tables, presses, and automatic feeds are shown. Get Catalog 60 from the company, or Circle Inform-A-Gram No. C59.

A New Milling Head described in a bulletin provides feed and speed ranges to meet the maximum cutting needs for rigidly accurate results in milling or drilling. Write Joseph Player for a copy, or Circle Inform-A-Gram No. C60.

A New Plasma Spray Coating and fabrication process, which can deposit nearly any material on metals, ceramics, and certain plastics, is described in new literature. Get a copy from Harper-Leader, Inc., or Circle No. C61.

NEW "PULL-PIN" EJECTOR PUNCHES*



CUT GRINDING TIME 90%

With no special tools—*just pliers*—you can pull ejector pins from punches *in seconds!* Pull-Pin Ejector Punches eliminate the costly procedure of disassembly of punches or removal of stripper plates.

Just pull the pin, depress the stripper, sharpen the punches, push the pin back in. Even closely grouped punches are prepared for grinding instantly.

NEW CATALOG shows round and shaped punches and dies. Information is provided on engineering specifications, material and heat-treating, punch and die clearances, blanking pressures, etc. Ask your distributor, or write direct.

*PAT. PEND.

New line includes Regular, Medium and Long lengths in Ring and head-type punches; complete range of press-fit and head-type stripper bushings; quill punches in 3 sizes.

RING PUNCH & DIE DIVISION
OF THE PRODUCTO MACHINE COMPANY
JAMESTOWN, NEW YORK

PRODUCTO

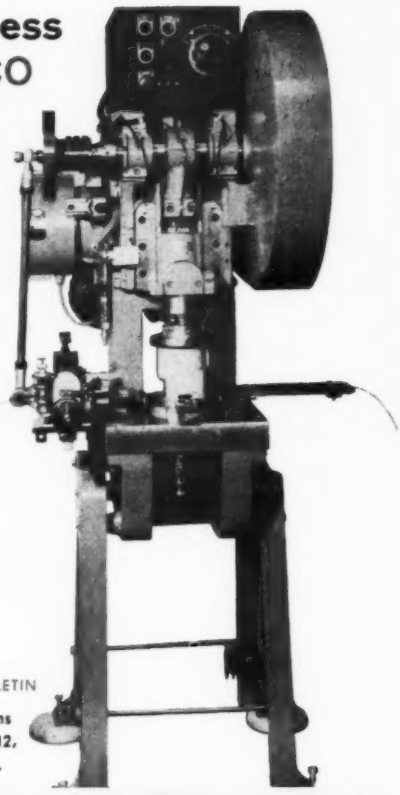
CIRCLE INFORM-A-GRAM KEY NO. 101

POSITIVE DIE PROTECTION
AT 350 STROKES/MIN.

Jobs diverted from $15,000 press to $3,000 KENCO ELECTRO-SAFE PRESS

A Los Angeles manufacturer of precision stampings produces burr-less parts at 350 strokes per minute in a Kenco 15-ton Electro-Safe Press. Due to critical die closure tolerances required to blank material as thin as .001", built-in die guidance formerly required heavy die set construction and the die capacity of a $15,000 straight side press. The $3,000 Electro-Safe and less expensive sub-press die represent major savings while offering positive die protection.

The advantages of Electro-Safe construction in high speed automatic operation lies in its fast-stopping capability — there is no clutch or high energy flywheel. Unique controls permit most effective monitoring by safety detectors that will stop the press in less than 1/3 stroke at high speed should a "fault" signal occur.



WRITE FOR ELECTRO-SAFE BULLETIN

—complete specifications and dimensions: 5, 8, 12, 15, 18, 23 and 26 tons.

KENCO MANUFACTURING COMPANY

THE MOST COMPLETE LINE OF SMALL PUNCH PRESSES IN THE WORLD

CIRCLE INFORM-A-GRAM KEY NO. 1021

TRIED • PROVEN • GUARANTEED MICRO MINIATURE END MILLS

3 & 4 Flute 3/32 through 3/16 by 1/32s

ALL SIZES SINGLE AND DOUBLE END

2 Flute 1/32 through 3/16 by 1/64s

2 and 3 Flute Flat or Ball End—4 Flute Flat End Only.

When you think of small END MILLS — think of MICRO MINIATURES

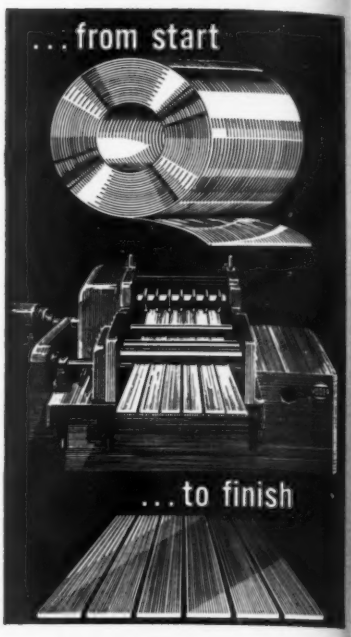
***DISTRIBUTORS** in principal cities*

STUB LENGTH IN ALL SIZES

Write for Catalog

WOODSON TOOL CO. 4811 Lennox Blvd. Inglewood, Calif.

CIRCLE INFORM-A-GRAM KEY NO. 1022



YODER ROTARY SLITTERS

If your slitting requirements call for coil widths from 12" to 60", in gauges from .015" to .250", the economy of purchasing Yoder Slitting Machinery can be yours. Operating a Yoder Slitting Line only one eight-hour shift per week, for example, could easily produce 35 tons of slit strands per week...or 1,820 tons every 52 weeks. At a slitting cost saving of only ½¢ per pound, the annual savings would amount to $18,200.

Additional savings can be realized through lowered inventory of mill-width coils – less waiting for delivery of special slit widths. Also, customer satisfaction will increase as you achieve faster completion and delivery of finished products.

At your request a Yoder sales engineer will study your plant operation to determine what equipment would most economically ... and profitably ... serve you, whether it be standard components or a completely specialized and engineered line.

Send for Yoder's illustrated text on slitting operations and equipment. It describes methods, time studies, operating cycles, material handling, and gives full specifications.

THE YODER COMPANY
5501 Walworth Avenue • Cleveland 2, Ohio

YODER ROTARY SLITTING LINES

CIRCLE INFORM-A-GRAM KEY NO. 1023

CIRCLE INFORM-A-GRAM KEY NO. 109

CTION

ERS

call for
gauges
omy of
achinery
Slitting
er week,
duce 35
or 1,820
ing cost
e annual
200.

realized
ill-width
ivery of
ustomer
as you
delivery

engineer
to deter-
ld most
tably . . .
ard com-
cialized

on slitting
es methods,
terial han-

PANY
nd 2, Ohio

ARY
ING
S

O. 1023

NO. 103

ON

S

for
ges
of
ery
ng
ek,
35
320
ost
ual

ed
lth
of
er
ou
ery

er
er-
st
..
m-
ed

ng
ds,
an-

Y
hio

P.U.P.S. are a refined standard drawn from A.S.T.M.E. Standards

pups

PROVEN **U**SAGE **P**UNCH **S**IZES

No more exasperating delays waiting for punches!

No more complex and costly punch inventories!

No more down-time waiting for a replacement punch!

No more assembly nightmares from holes in parts that won't do the job!

Hole sizes you need are few and simple because most needs for holes are already highly standardized, (screws, rivets, wires, shafts, etc). Hole sizes **specified,** however, are several times more numerous because product engineering has had no basis for standardization.

Hole sizes thus **produced** are no less than a multitude and you are either stocking, making or buying replacement punches and dies for every one of that multitude!

Die builders have had no practical standard punches and dies readily available at low cost. They have not been able to use the tolerances allowed so that punch size specification was decided by "rules of thumb."

Dayton's **P**roven **U**sage **P**unch **S**izes correct all this and simplify your specifications, your dies and your products, because 8 out of 10 times they make all the holes you need!

A major appliance manufacturer reports impressive savings resulting from a reduction of 186 punch diameters that had to be maintained, to only 17 P.U.P.S. now doing a better job with fewer problems.

Get low first cost and fast replacement right off the shelf . . . improve production with quality tools and cut replacement costs, down-time and inventory with Dayton's Proven Usage Punch Sizes!

Dayton's P.U.P.S. are being Stocked From Coast to Coast!

For more information about this revolutionary concept of interchangeable perishable tools from local stock and the name of your nearest Distributor, simply tear off this perforated card and mail it today.

name

title

company

address

city state phone

DON'T Be a ...

"PROFITPASSERUPPER"*

AUTOMATE YOUR DRILL PRESSES with GENERAL AUTOMATIC DRILL FEEDS and increase Production 200% and more.

Eliminate Tiresome Hand Operation!

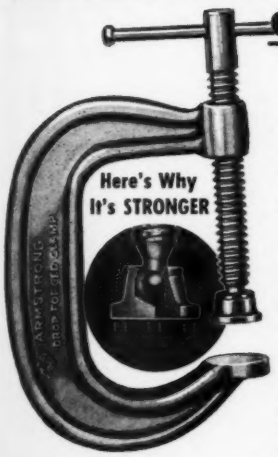
**A "PROFIT PASSER UPPER" is one who has not as yet equipped his Drill Presses with General Automatic Drill Feeds.*

Send for FREE literature

GENERAL TOOL DIVISION
THE GENERAL FIRE EXTINGUISHER CORP.
8740 WASHINGTON BOULEVARD
CULVER CITY, CALIF.

CIRCLE INFORM-A-GRAM KEY NO. 1051

New ARMSTRONG Swivel Pad can't come off



NOW ARMSTRONG deep throat "C" Clamps have the new (Pat. apd. for) ARMSTRONG Ball-joint Swivel Pad. This "C" Clamp pad, developed by ARMSTRONG Engineers, is tougher than any on the market. Rigorous testing in our own plant first proved this fact, and field tests in factories throughout the country have confirmed our own test results.

The lip of the opening in the ARMSTRONG Ball-joint Swivel Pad is undercut so that when the ball of the screw is inserted, and the lip is permanently forced down, a solid steel wall is formed, inside the pad cavity, completely encircling the ball.

This wall of steel makes it impossible for the pad to come off the screw during normal use. In fact, our tests have proved that it is virtually impossible to intentionally knock the pad off with a hammer—yet the pad is free to swivel through an arc of approximately 40°.

Call your ARMSTRONG Distributor

Your ARMSTRONG Distributor can offer delivery from stock on this "400-Series" deep throat, drop-forged "C" Clamp with the new Ball-joint Swivel Pad. He also carries in stock the other styles of clamps in the ARMSTRONG Line—the broadest line of drop forged "C" Clamps.

ARMSTRONG BROS. TOOL CO., 5220 W. Armstrong Ave. Chicago 46, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1052

CIRCLE INFORM-A-GRAM KEY NO. 104

Now ready:

Manual of Machinability and Tool Evaluation

by ANTONI NIEDZWIEDZKI
Machining Consultant

TYPICAL CHAPTER COVERAGE: Tool Life Formulas . . . Tool Life Criterion . . . Chip Load and Workpiece Hardness . . . Tool Geometry . . . Test Records . . . Tool Inspection . . . Machinability Classification . . . Machine Tool Selection.
The Manual contains a wealth of examples and forms for Development Sheets . . . Recommendation Sheets . . . Crossed Charts . . . Tool Life Tables . . . Graphs and Drawings . . . covering work with Carbides and HSS on Cast Iron and Steel.
This is a reference book and is wire bound to lie flat at any page for easy reference.

ORDER YOURS TODAY!

★ ★ ★

USE COUPON

10-DAY EXAMINATION ALLOWED.
Manual is returnable for full credit or refund if returned in saleable condition.

HUEBNER PUBLICATIONS, INC.
P. O. BOX 3505, 1975 LEE ROAD, CLEVELAND 18, OHIO

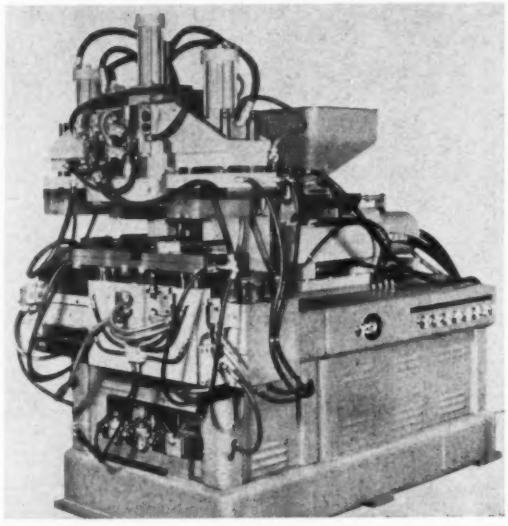
Gentlemen: Please ship as soon as possible ..... copies of MACHINABILITY AND TOOL EVALUATION at $6.00 per copy.

Company .....
By ..... Title .....
Address .....
City ..... Zone ..... State .....

Open account shipments to rated companies. Otherwise, payment with order, please. No C.O.D.'s. Ohio customers add 3% sales tax.

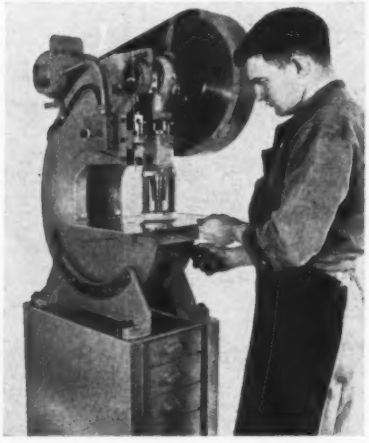
Product News

Blowmold Machine



A completely automatic injection type blow molder can mass produce plastic bottles, jars, and other products. Model 1246 Duplimatic Blowmolder eliminates any secondary operations and there's no "pinch off" to trim. Contact The Moslo Machinery Co., 2484 Prospect Ave., Cleveland 15, or Circle No. P1.

New Punch Press

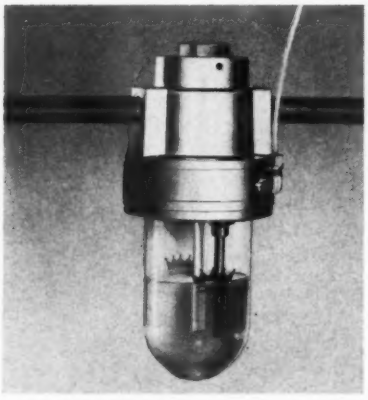


A new 5-ton OBI punch press with a 12" throat depth allows working to the center of a 24" sheet. This Di-Acro No. 5 is used for high-speed production operations. Practical rate for single stroke cycling is 150 spm. Write O'Neil-Irwin Mfg. Co., 626 8th Ave., Lake City, Minn., for details, or Circle No. P2.

Epoxy Adhesive

A tensile shear of 2,200 psi at 300°F on aluminum to aluminum for Hysol 4322 adhesive has been announced by Hysol Corp., Olean, N.Y. The adhesive won't flow during cure and is ideally suited for bonding porous surfaces. Get Bulletin A-304 from the company, or Circle Inform-A-Gram No. P3.

New Lubrication Device



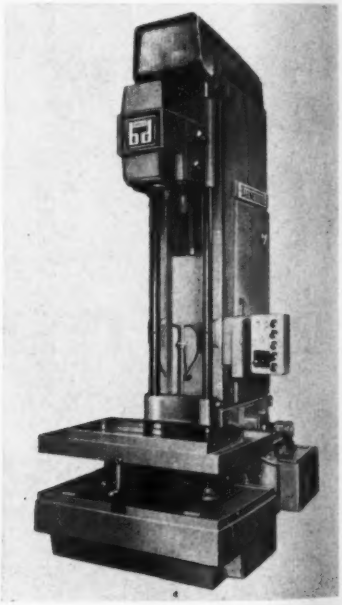
For lubricating air-operated devices, use the Crown pulse lubricator that delivers exactly the required amount of oil to the spot where lubrication is needed. It operates on pressure variations and is entirely independent of air flow rates and duration of flow periods. Contact Parker-Hannifin Corp., 501 S. Wolf Rd., Des Plaines, Ill., for details or Circle No. P4.

Portable Coolant System

The new "Custamist" fine fog coolant systems are available in a wide variety of styles for use with all machining operations. With them there is no pressure in the tank and work visibility is increased because there is no need for splash guards. They operate from any standard airline. For details, write The Custanite Corp., 1228 Utica Ave., Brooklyn 3, N.Y., or Circle Inform-A-Gram No. P5.

New Vertical Honer

A new vertical honer will hone bores up to 10" dia at maximum stroke, and will handle larger diameter bores in shorter lengths.



Model 3010 is available with 25", 35", 45", or 60" spindle travel. Contact Barnes Drill Co., Rockford, Ill., for details, or Circle No. P6.

You Need an Extra Hand Now to Speed Up Production!

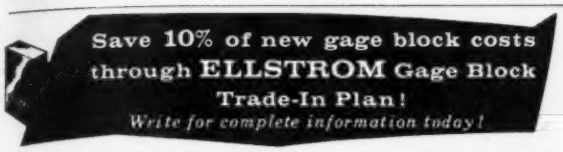
HEIMANN TRANSFER SCREW SETS

IN 11 SIZES No. 6 to 1" N.C. In all S. A. E. sizes.

Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench —no other tools needed. Get more work *now*—save money too!

HEIMANN MFG., CO. • URBANA, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1071



ELLSTROM STANDARDS DIVISION • DEARBORN GAGE CO.
22038 BEECH STREET • DEARBORN, MICHIGAN
Measuring in Millionths for Three Generations

CIRCLE INFORM-A-GRAM KEY NO. 1072

LEAD HAMMERS—Buy Cook "SHUR-GRIP"

They're a MUST in every shop where many blows have to be struck without marring surfaces. Available with "SHUR-GRIP" drop forged handles.

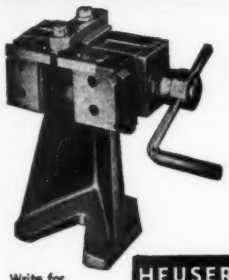
Write for circular and prices

COOK'S LEAD HAMMER SERVICE
68 Massasoit Ave., E. Providence 14, R. I.

CIRCLE INFORM-A-GRAM KEY NO. 1073

SPEED UP DRILLING & TAPPING JOBS!

JOHN'S DRILL JIG



For cross or end drilling round, hexagon, or square stock or standard or odd-shaped rough castings from ⅛" to 8" O.D., the self-centering "John's Drill Jig" will cut tooling and production costs to minimum for 10 to 100,000 pieces.

Standard removable slip fit bushings and holders available to drill center or mean off-center. The self-centering action will hold within .0015" or better regardless of jig wear or piece part O.D. variation. Jigs available in three sizes 6", 8", 14"; jaw openings 2", 3¼", 7½".

Write for complete information.

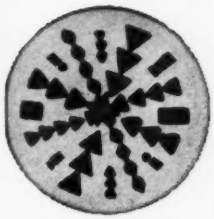
HEUSER MANUFACTURING CO.
1642 N. Paulina St., Chicago 22, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1074

BARREL FINISHING MEDIA

No jamming or "rolling over." Special shapes prevent jamming and rapid deburring saves costs.

Write for complete information.



FORTUNE INDUSTRIES, INC.
11770 Dexter Road, Chelsea, Mich., Phone GR 9-3621

CIRCLE INFORM-A-GRAM KEY NO. 1075

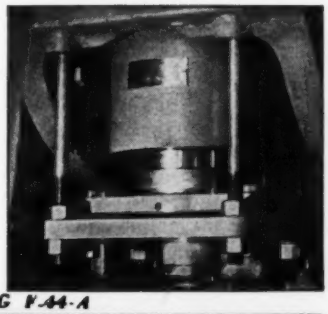
DIE CUSHIONS

by Dayton Rogers

FOR ALL PUNCH PRESSES

to assure accurate working pressure on all dies

- Single installations from 1 ton to multiple installations of unlimited capacity, standard or designed on the job.
- Quotations on request.
- Best possible delivery.



11 Ton Full Universal Pneumatic Die Cushion Installed on Inclinable Press. →

WRITE FOR CATALOG P-44-A

DAYTON ROGERS *Manufacturing Company*

MINNEAPOLIS 7B, MINNESOTA

CIRCLE INFORM-A-GRAM KEY NO. 1076

Two for One

TAP & DEBURR IN ONE OPERATION

Just slip Burr-Bit on any make tap—holes are deburred automatically, leaving a smooth, clean chamfer.

1 set-up—
1 operation—
instead of 2!

Burr-Bit by Vernon Devices is made of the finest quality high speed tool steel. It fits all 2, 3 and 4 flute taps, and can be used on almost any material.

Write for complete data and learn how you can save on your tapping operations.
Dept. TP-10.

BURR-BIT

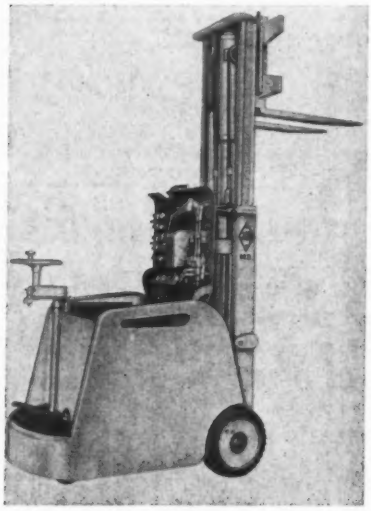
VERNON DEVICES, Inc.
481 East 3rd Street
Mount Vernon, N. Y.
MOunt Vernon 4-1686

CIRCLE INFORM-A-GRAM KEY NO. 1077

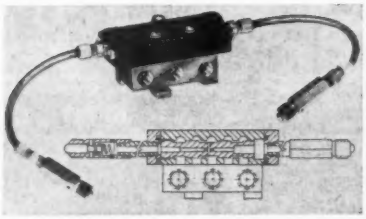
Product News

Electric Lift Truck

All hydraulic and electric control mechanisms are mounted on the under side of the top cover of the Scott electric lift truck to afford immediate access. It's available in 3000 to 4000 lb capacity models. Contact James Campbell Smith, Inc., 4057 Erie St., Willoughby, Ohio, for details, or Circle Inform-A-Gram No. P7.



New Air Valve

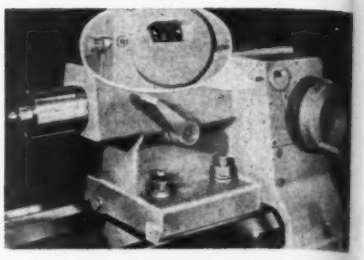


Ideal for sequencing and other automatic application is a 4-way, 1/4", 5-ported, pilot-operated air valve. It's capable of over 1000 cpm and has a life expectancy exceeding 50,000 cycles. For information write Alkon Products Corp., 200 Central Ave., Hawthorne, N. J., or Circle Inform-A-Gram No. P8.

New Counterbore

A new interchangeable blade counterbore cuts hard or soft materials either forward or backward and it's ideal for enlarging hole sizes. A socket set screw secures the blade in the solid one-piece shank and pilot; a simple adjustment permits quick interchange of blade sizes or replacement. Write Multi-Tool Co., 14512 Burt Rd., Detroit 23, for data, or Circle Inform-A-Gram No. P9.

Direct-Reading Counter



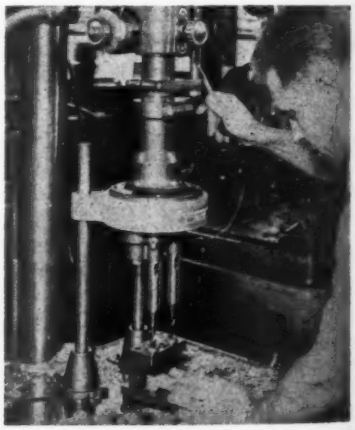
A new direct-reading digital traverse dial counter automatically shows the movement and setting of the stock spindle of a lathe in 0.010", eliminating error-prone calculations and costly mistakes in drilling and boring. For details, write Durant Mfg. Co., 1974 N. Buffum St., Milwaukee 1, Wis., or Circle Infrom-A-Gram No. P11.

Bond Nylon to Nylon

A new two-component 100% solids epoxy adhesive, Hysol 4219, bonds nylon to nylon at room temperature. For information, write Adhesive and Sealants Dept., Hysol Corp., Olean, N.Y., for Bulletin A-2042, or Circle Inform-A-Gram No. P12.

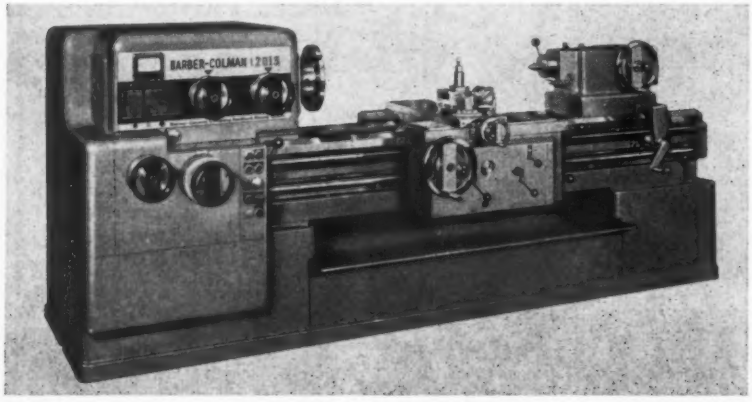
Heavy Duty Drill

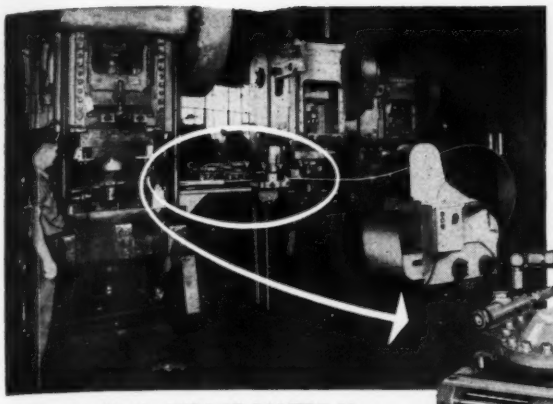
Designed to handle up to and including 5/8" drills in steels, Model 600 multiple spindle drill can be quickly attached to any drill press. Its adjustable spindles permit drilling or tapping a variety of hole patterns in a 6 1/4" dia circle. Get catalog from Commander Mfg. Co., 4225 W. Kinzie St., Chicago, for details, or Circle Inform-A-Gram No. P13.



Versatile Precision Lathe

A precision, heavy-duty lathe with spindle speeds up to 2000 rpm and hydraulic tracer is new from Barber-Colman Co., Rockford, Ill. The geared head No. 2013T unites many of the qualities of a roughing lathe with all of the versatility, controls, and precision of a toolroom lathe. It combines 66 thread and feed changes, feed range from 0.0015 to 0.091 ipr, automatic threading stops, and other toolroom features. For details, Circle Inform-A-Gram No. P10.





Ses-Matic AIR FEED

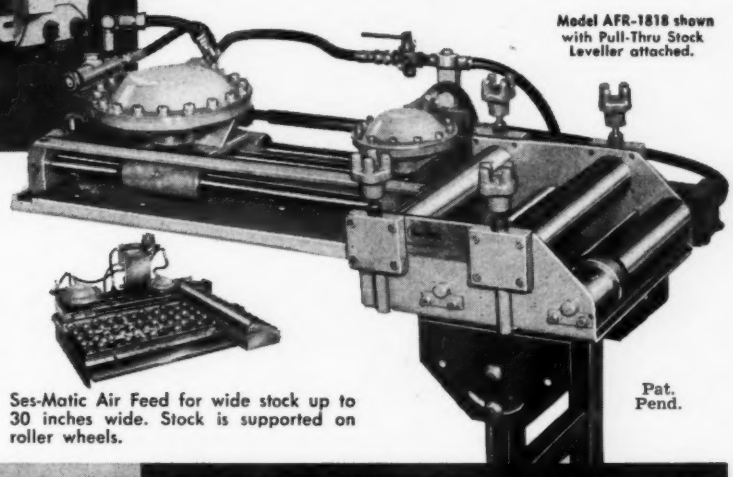
The Secret of Successful, Accurate Feeding of . . .

STEEL, ALUMINUM, PLASTIC, LEATHER, ETC.

Model AFR-1818 shown with Pull-Thru Stock Leveller attached.

• The Ses-Matic "SPACE-SAVER" Line featuring the Ses-Matic Air Feed, Pull-Thru Stock Leveller and Coil Cradle.

Ses-Matic Double Air Feed for materials up to 72 inches wide. This unit feeds stock 72" wide by .074 thick and removes coil bend with a Pull-Thru Leveller.



Ses-Matic Air Feed for wide stock up to 30 inches wide. Stock is supported on roller wheels.

Pat. Pend.

Ses-Matic

Write for complete literature on all models of Ses-Matic Air Feeds and other Press Room Equipment.

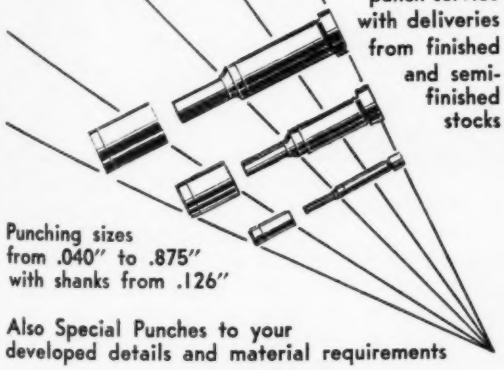
SPECIAL ENGINEERING SERVICE, INC.

7628 Wyoming • Dearborn, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 1091

AMERICAN STANDARD PUNCH CORP.

Provides a punch service with deliveries from finished and semi-finished stocks



Punching sizes from .040" to .875" with shanks from .126"

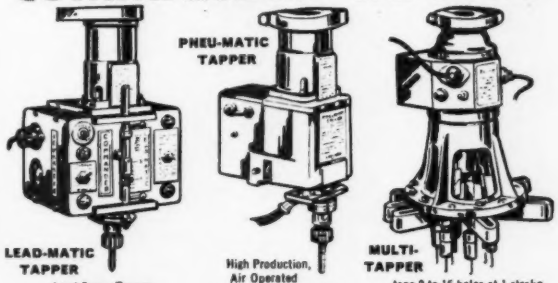
Also Special Punches to your developed details and material requirements

Write for Bulletin

AMERICAN STANDARD PUNCH CORP.
10013 FRANKLIN AVENUE, FRANKLIN PARK, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 1092

COMMANDER TAPPERS



LEAD-MATIC TAPPER
Lead Screw Tapper
Range: 0-80 to ½"-16

PNEU-MATIC TAPPER
High Production, Air Operated
Range: 0-80 to ¼"-16

MULTI-TAPPER
taps 2 to 15 holes at 1 stroke, Adjustable hole pattern

a Type and Size for Every Job!

MIDGET TAPPER
Pressure Sensitive Drive
Range: 0-80 to 10-24

STANDARD TAPPER
Adjustable Torque Control
Range: 0-80 to ½"-16

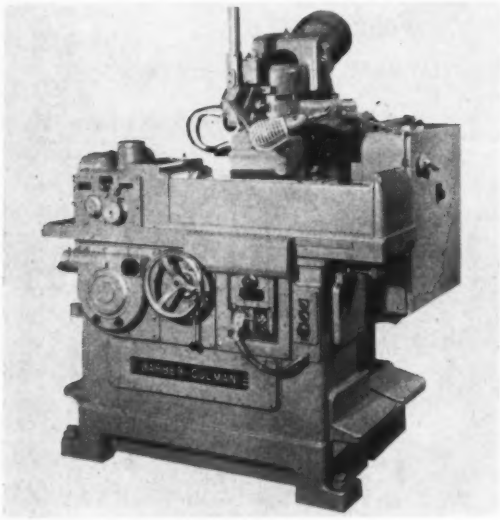
Commander Tappers are made in 10 models —each designed to handle tapping jobs over a wide range. From the Commander Tapper line, you can select the right unit to give you the exact performance your job requires. Whichever Commander Tapper you select, you will get unequalled performance and tapping economy. Sold and serviced by drilling and tapping specialists. Write for the Commander Production Tool Catalog and name of nearest Distributor.

Commander MFG. CO.
4228 WEST KINZIE STREET • CHICAGO 24, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1093

Product News

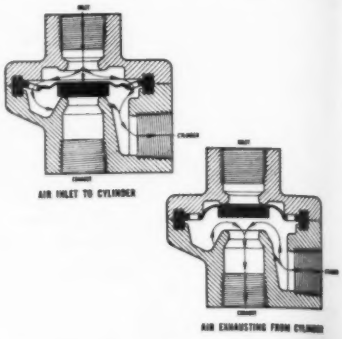
Automatic Dresser Cuts Costs



A new automatic dresser reduces direct and indirect tool costs through improved control of sharpening operations performed by Barber-Colman Co.'s No. 6-5 hob sharpening machine. Speed, accuracy, finish, wheel wear, diamond life and spark-out are controlled automatically and continuously while sharpening hobs, thread mills, or form cutters. Operators never stop the machine to dress the wheel. For details, contact Barber-Colman Co., Rockford, Ill., or Circle Inform-A-Gram No. P15.

Quick Exhaust Valve

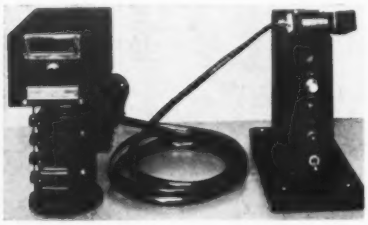
A new Pneu-Trol quick exhaust valve made by Auto-Ponents, Inc., 3001 Grant St., Bellwood, Ill., incorporates unrestricted internal passages to prevent clogging from



contaminated air lines, and a diaphragm that gives complete venting of exhaust air. By providing quick dumping of exhaust air at the cylinder, this valve eliminates the need for large diameter piping and large selector valves. Get details from the company, or Circle Inform-A-Gram No. P18.

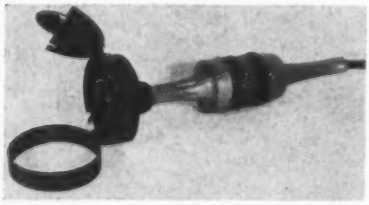
Remote-Mike

Automatic micrometer measurements to 0.000010″ can be taken by an operator located far away from the actual point of measure-



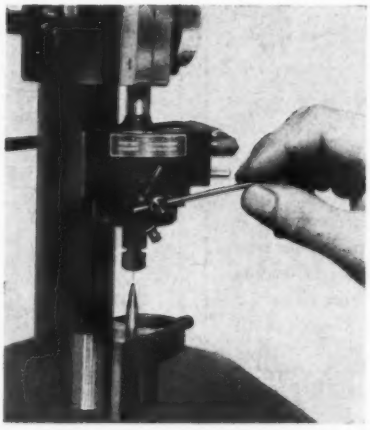
ment with the Carson-Dice Remote-Mike. Measuring range is 1″ and heads may be used singly or in multiples. Get details from J. W. Dice Co., Englewood, N.J., or Circle Inform-A-Gram No. P14.

Rubber Grinding Wheel



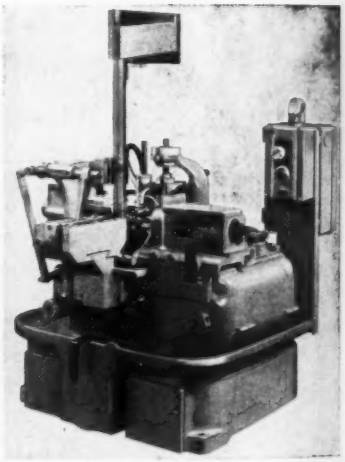
For use with coated abrasive belts, a new solid rubber grinding wheel is being offered on Thor 6″ straight air grinders. The Mermac wheel fits directly on the spindle of the grinder. Advantages include quick changing of belts, continuous balance, and finer finishing. Get details from Thor Power Tool Co., 175 N. State St., Aurora, Ill., or Circle Inform-A-Gram No. P16.

Miniature Drill



A high speed air turbine floated on air-oil bearings is utilized by a new miniature drill that can be mounted on any standard drill press, jig borer, miller, or lathe. It permits fast, high, accurate drilling of holes from 0.032″ to 0.001″ dia. Get details on the Turbo-Drill from Milburn Machine Works, 203 Milburn Ave., Baldwin, L.I., N.Y., or Circle No. P17.

Miniature Gear Hobber



A new gear hobbing machine, with shuttle-type loading and complete automation, has speeds up to 4084 rpm for fast, high-volume production of small, fine-pitch instrument gears. The No. 1-1/2 can perform all handling and hobbing operations on small spur gears, pinions, and special tooth forms at rates higher than 1000/hr. For details, contact Barber-Colman Co., Rockford, Ill., or Circle Inform-A-Gram No. P19.

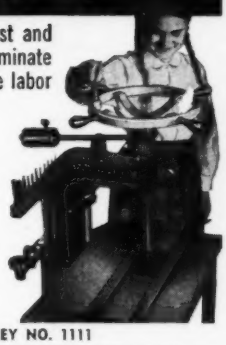
LASSY TAPPERS . . .

Lassy Tappers make tapping easy, fast and simple. Exclusive patented features eliminate guess work, drastically reduce labor costs, save taps.

3 SIZES.

FREE ILLUSTRATED CATALOG AND PRICES.

UNCONDITIONALLY GUARANTEED



LASSY TOOL CO.
PLAINVILLE, CONN.

CIRCLE INFORM-A-GRAM KEY NO. 1111

SPELLMACO SPOTTERS

A matched set of transfer punches for toolmakers, machinists and tool cribs.

Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel carefully heat treated and tempered for long life. .0025 undersize to facilitate use—black oxide finish.

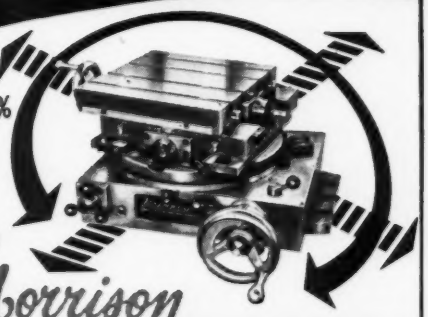
Set No. 3-17: 28 punches with indexed stand — sizes 3/32" to ½" by 1/64" plus handy 17/32" size—length 4⅞". PRICE only $19.40

Single sizes available.

R. L. SPELLMAN CO. • Urbana, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 1112

NOW ALL MILLING MACHINE OPERATIONS ...WITH ONE SET-UP!



Morrison

CROSS / SLIDE ROTARY TABLE

This rugged, precision-built tool will save you up to 90% of your normal set-up time, depending on the complexity of the job.

No unclamping and reclamping of the work-piece is necessary. Simply dial your work to each new position in seconds. No special training is needed for operation. No layout is necessary on the work-piece.

Send for descriptive literature and prices today!

MORRISON MACHINERY & ENGINEERING CORP.

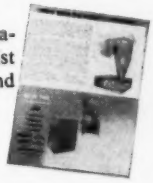
935 West Lake Street, Dept. TP, Chicago 7, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1113

Now, with more than fifty models in the Dustkop line—plus efficient accessory items—the odds are that a standard unit will solve your problem. Dustkop units solve other problems too. They're easier to install, save space and money and are virtually maintenance-free!

how to select a dust collector

This new brochure includes all basic information needed to select the right dust or mist collector for grinding, buffing, polishing and other types of service. Write for your copy. No obligation.



AGET Manufacturing Company
1394 Church St., Adrian, Michigan

DUSTKOP STOPS DUST

CIRCLE INFORM-A-GRAM KEY NO. 1114

Free Sample Tube

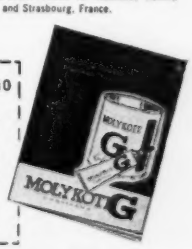
Industry's NEWEST Production TOOL

MOLYKOTE® G LUBRICANT

- ALMOST 100% SAFETY AGAINST GALLING AND SEIZING WITH ALL BEARING METAL COMBINATIONS
- ELIMINATES STICK-SLIP, METAL PICK-UP AND DISTORTION IN PRESS FITTING
- REDUCES WEAR-IN TIME AND DAMAGE IN NEW OR REBUILT MACHINERY
- THE HIGHER THE LOADS, THE GREATER THE MARGIN OF SUPERIORITY OF MOLYKOTE G

Write for your free sample of MOLYKOTE G LUBRICANT today. We will also send you a copy of our new Bulletin 126 which gives complete details. THE ALPHA-MOLYKOTE CORPORATION, 65 Harvard Avenue, Stamford, Conn. Phone Fireside 8-3724. Plants in Stamford, Conn., Munich, Germany and Strasbourg, France.

THE ALPHA-MOLYKOTE CORP. TP-10
65 Harvard Ave., Stamford, Conn.
Please send me a free sample of your MOLYKOTE G Lubricant.
NAME_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE____ STATE_____



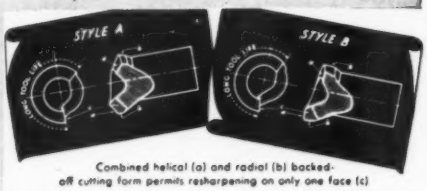
CIRCLE INFORM-A-GRAM KEY NO. 1115

BOKUM BORING TOOLS are *Designed* for boring

STYLE A for general boring

STYLE B for bottoming and facing

STYLE C for internal threading



Combined helical (a) and radial (b) backed-off cutting form permits resharpening on only one face (c)

Design is based on a mathematical formula which guarantees correct cutting and clearance angles anywhere around the periphery of cutting head—maintained uniformly within limits of ± few minutes of 1°.

Bokum tools are available in 3 cutting materials: (1) super high speed steel, Cat. 1139-6; (2) carbide tipped, Cat. 398; (3) solid carbide, Cat. 948.

In range of sizes to bore holes from 1/16" dia. up.

To extend further the already long life of Bokum Tools, we recommend the Resharpening Fixture, Cat. AB1 and AB412. Tool holders, vertical adjustment and fixed position, Cat. 483.

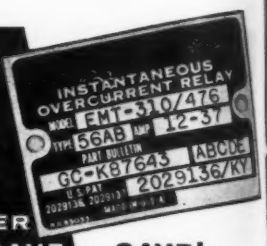
Because Bokum Boring Tools are ***designed,*** *they are uniform and remain uniform.*

TRADE MARK REG. U. S. PAT. OFF.

BOKUM TOOL CO. 14775 Wildemere Ave., Detroit 38, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 1121

Now! MARK **NAME PLATES** 5 TIMES FASTER ...and SAVE...SAVE ...SAVE!



WITH *Automark* ELECTRIC TAG MARKING TYPEWRITER

MODEL EMT-2

A NEW ERA IN NAME PLATE MARKING

Just a touch of the finger delivers up to 2 TONS pressure for deep, legible impressions on metal or plastic tags. Standard electric typewriter keyboard — over 100 characters a minute. A modern marvel!

SEND NOW FOR BULLETIN

DEFIANCE MACHINE & TOOL COMPANY

1920 S. VANDEVENTER Dept. TP ST. LOUIS 10, MO

CIRCLE INFORM-A-GRAM KEY NO. 1123

525% PRODUCTION INCREASE with AUTOMATIC SILVER SOLDERING

A prominent steel caster and wheel manufacturer has jumped his production from 80 arc-welded joints to 500 brazed joints per man hour on steel caster and wheel halves by changing over to the G.A.S. engineered silver-brazing unit illustrated. Replacing copper brazing or arc welding, requiring skilled operators, the G.A.S. unit at this plant achieves these major advantages:

- Less scrap loss
- Lower costs through more flexible operation
- Use of lighter gauge steel due to lower temperature brazing
- Semi-skilled operators

The G.A.S. engineered silver-brazing unit, with variable speed drive, operates as a continuous or indexing unit, as desired, The height of the fixture table is adjustable.

Today . . . send brief description of your heat processing requirements for G.A.S. economical and efficient solutions. No obligation.

INDUSTRIAL GAS EQUIPMENT DIVISION CODE OF ETHICS SIGMER GAS APPLIANCE MANUFACTURERS ASSOCIATION SIGNER NO. 46

GAS APPLIANCE SERVICE, INC.

Heat Process Engineers

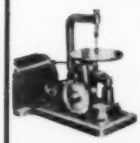
1936 West Balmoral Ave., Chicago 40, Ill.

Representatives in Major Industrial Areas

CIRCLE INFORM-A-GRAM KEY NO. 1122

Positive Accuracy!

NEW HIGH SPEED DIE FILING MACHINE



Positive accuracy is assured because files are held rigidly above and below table in yoke, which reciprocates on two hardened rods that move in accurately machined guide holes. Uses Standard 3-1/2" or 4" Parallel Machine Files as small as 3/64" in diameter.

SPECS — Table diam. 6"; stroke 1"; throat 3-1/2"; capacity 1-1/2" material thickness; weight 50 lbs.; height 14"; motor 1/4 H.P.; base 8-1/4" x 19"; speed 375 strokes per minute.

HIGH SPEED HAMMER CO., INC.

307 Norton Street, Rochester 21, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1124

HARCO STANDARD FIXTURE CLAMPS AND DETAILS

Save Tool Room Time!

Precision-machined, hardened, rust-proofed. Fast delivery from stock! Cut design time, increase tool room production and save many man-hours by specifying STANDARD HARCO FIXTURE CLAMPS AND DETAILS.

Write for free catalog today!

HARCO ENGINEERING

12094 Woodbine Avenue

Detroit 39, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 1125

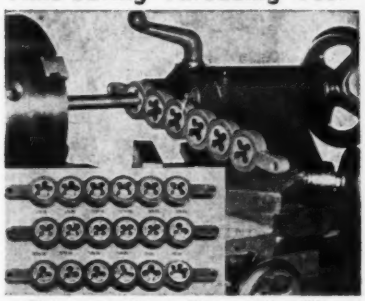
Product News

Drill-Ream Tool

Setups and handling are halved with the Dreamer, a new combination hss drill and reamer. Special deep flutes for proper chip removal are ground, not milled, for greater accuracy, and finished

tolerances are held to ± 0.0001. The tool, available in both taper and jobbers lengths, is also made from cobalt alloys for use on stainless steel. For details, write The Custanite Corp., 1228 Utica Ave., Brooklyn, N. Y., or Circle Inform-A-Gram No. P20.

Time-Saving Threading Tool

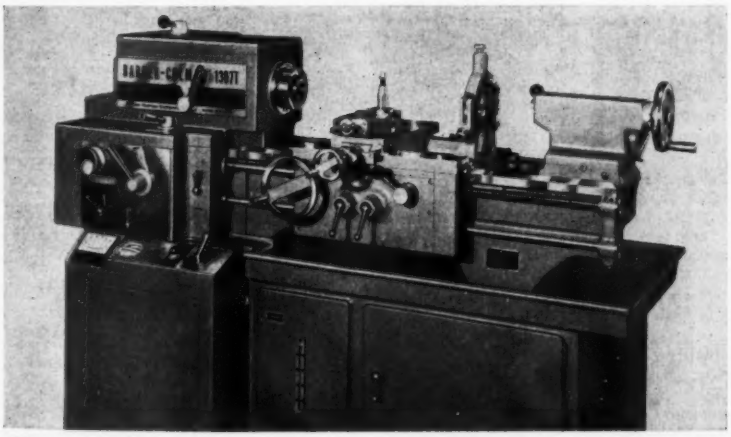


This new threading tool will cut different thread sizes from ⅛″ to ½″ in U.S.S. and S.A.E., plus ⅛″ and ¼″ pipe threads. The dies are permanently mounted in three tools and are always ready for use. For information, write Mohr Tool & Mfg. Co., Box 630, Maywood, Ill., or Circle No. P21.

Quick Stop For Presses

An Electric clutch brake stops transfer presses in 1/2 rev, preventing costly damage to tooling and other parts. The Baird Machine Co., Stratford, Conn., is installing the new clutch on the Model 2-19 and Model 3-25 high speed transfer presses as optional equipment. It can easily be incorporated into electronic gaging and inspection during production runs and allows a single operator to simultaneously run several machines. Write the company, or Circle Inform-A-Gram No. P22.

Toolroom Lathe



High capacity and timesaving controls have been combined in the super-precision Model 1307T 10″ toolroom lathe introduced by Barber-Colman Co., Rockford, Ill. Infinitely variable speeds to 3000 rpm in belt drive can be changed under load, and 66 feed and thread-cutting changes can be quickly selected in each of two ranges. For more data, write the company or Circle No. 23.

MINIATURE DRILL BUSHINGS
Hole Sizes—No. 80 to 3/32″
O.D. 3/32″ to 13/64″
Lengths ¼″ to 3″
.0002 Tolerance on I.D.
O.D., and Concentricity
Specials to your specifications
WRITE FOR CATALOG
PREBCO BUSHING CO.
14714 East Arrow Hwy., Baldwin Park, Cal.
CIRCLE INFORM-A-GRAM KEY NO. 1131

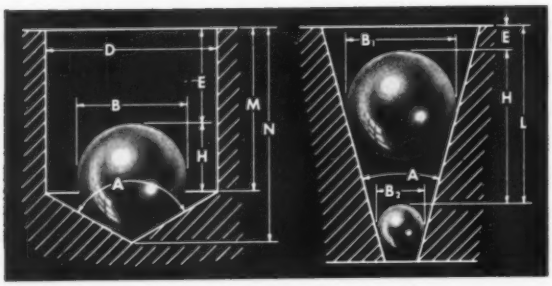
ELLSTROM
Gage Block Inspection and Calibration Service prevents confusion, errors, costly scrap losses
Write for complete information today!
ELLSTROM STANDARDS DIVISION
DEARBORN GAGE COMPANY
22038 BEECH STREET
DEARBORN, MICHIGAN
Measuring in Millionths for Three Generations
CIRCLE INFORM-A-GRAM KEY NO. 1132

DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
WATTS BROS. TOOL WORKS
Wilmerding, Penna.
CIRCLE INFORM-A-GRAM KEY NO. 1133

HARDNESS TESTING
has been done with the SCLEROSCOPE
Since 1907
•
THE SHORE INSTRUMENT & MFG. CO., Inc.
90-35 Van Wyck Expressway
Jamaica 35, N. Y.
CIRCLE INFORM-A-GRAM KEY NO. 1134

KELLER Die Filers Deluxe $149.50
3 MODELS
ECONOMY — 4 Way tilting table, with motor, $109.50
STANDARD—Has file roller support, with motor, $131.50
DELUXE—Has reciprocating vertical slide, with motor, $149.50

Sales Service Mfg. Co.
2361 University Avenue
St. Paul 14C, Minnesota
Ask your Industrial Distributor or write TODAY for BULLETIN 256
CIRCLE INFORM-A-GRAM KEY NO. 1135



Tungsten Carbide
MASTER BALLS

- **For simplified checking** of hole depth, ID's, internal tapers — setting comparator gages — many other uses in shop, tool room and gage room.
- **Accurate to .000,010"** on size and sphericity.
- **Extremely hard** and wear-resistant. *Do not pit or rust* from handling or humidity.
- **Available from stock** in sets or individually in 31 sizes — 1/16" to 1" by 1/32" increments.

BULLETIN P-41 gives specs and prices. BULLETIN B-41 gives hole-checking methods and formulas. Write for them!

INDUSTRIAL TECTONICS, INC.
iTi
MANUFACTURERS OF PRECISION BALLS AND BEARINGS
BALL DIVISION: 3686 JACKSON RD.
ANN ARBOR 4, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1141

ALL NEW
MARK II Shoplifter
New Low Price $195.00*
New Capacity Full 750 lbs.

All lifters at this price *are not* the same. Compare and note the quality of the new Mark II, which now replaces the Type D Shoplifter. Full 750 lb. capacity can be handled safely anywhere on the platform.

No-drift, full control hoist unit. Raise or lower the load to fractional positioning. Built for years of continuous service with minimum maintenance. *Complete* safety features included at no extra cost.

Applicable in small plants for "too heavy to lift loads" and in large plants to supplement powered equipment. The economical way to transfer molds and dies, unload trucks, stack in narrow aisles, or raise parts and machinery to working levels.

Write for specifications and other details.

ECONOMY ENGINEERING
4509 W. Lake St., Chicago 24, Ill.
*Priced f.o.b. Chicago

CIRCLE INFORM-A-GRAM KEY NO. 1142

VALUABLE REFERENCE

free 84-PAGE CATALOG

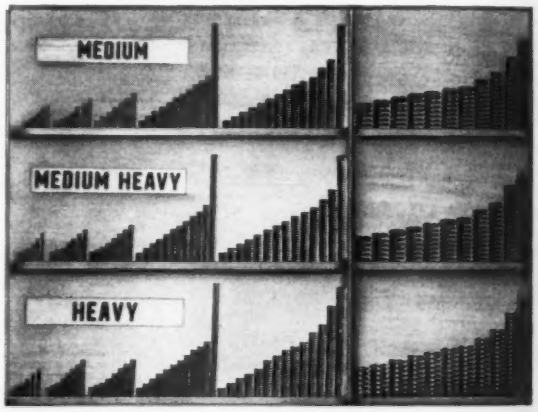
One Complete Source of Detailed Specifications for Designers Production Managers Toolroom Foremen

Hundreds of NEW ITEMS

ALL NEW — Complete specifications and cost saving data on over 2000 "Standards", including world's largest line of work-holding equipment, chuck jaw blanks, handles, knobs, wheels, strap clamp assemblies, forged items, plus hundreds of other jig and fixture components. Detailed specifications, engineering drawings. The one complete source for data on all the "standards" for tool, die, jig, and fixture design and application. Write for your FREE copy today.

JERGENS TOOL SPECIALTY CO.
DEPT. TP-10, 712 E. 163rd ST., CLEVELAND 10, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1143



Die Springs - CHROME VANADIUM STEEL

Fine quality die springs carried in stock —wide selection of hole and rod sizes, lengths and deflections. Three pressure ranges — medium, medium-heavy, heavy. Long life reduces down-time.

Write for free list of stock sizes, prices, and name of nearest distributor.

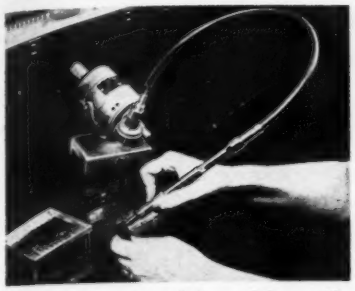
Raymond Manufacturing Division
Associated Spring Corporation
Corry, Pennsylvania

CIRCLE INFORM-A-GRAM KEY NO. 1144

Product News

Miniature Screwdriver

All kinds of screws and nuts from #0 to #4, and larger in certain cases, are handled by this electrically driven, flexible shaft

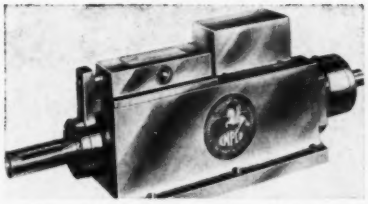


type power screwdriver. It's available in bench and hand models, and is designed for production work on small assemblies and for intricate jobs otherwise inaccessible. Foredom Electric Co., Inc., Bethel, Conn., supplies details, or Circle Inform-A-Gram No. P24.

Portable Sandblaster

Designed for use where fast, economical sandblasting is necessary, this Handi-Blast sandblaster requires no more air than a production spray gun. Features include built-in sand funnel, automatic opening and closing filler valve, and a specially designed Vari-flow air operating valve. Write Hamill Mfg. Co., Inc., Washington, Mich., for literature, or Circle No. P25.

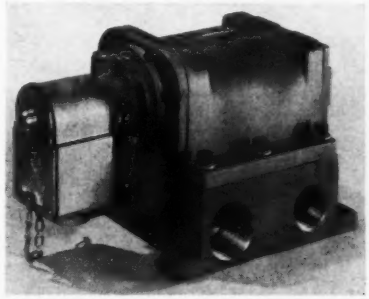
Hydraulic Feed Unit



For simplified control of complex machining operations, use the new hydraulic feed unit announced by Enterprise Machine-Parts Corp., 2732 Jerome St., Detroit 12. Empco HF-425 Hydro-Feed can be used independently or with other hydraulic equipment for production operations that require an even feed in any part of the stroke. Write Enterprise for details, or Circle No. P26.

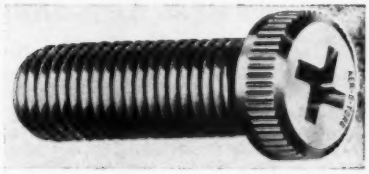
Air Control Valve

Increase service life and simplify maintenance by using the new 2-position, 4-way poppet type air



control valve. It has the basic 1" capacity and is available with ¾", 1", and 1¼" NPT ports. For details, write Hoffman Valves, 2360 W. Dorothy Lane, Dayton 39, Ohio, or Circle Inform-A-Gram No. P27.

Space Saving Screws



A cap screw that utilizes the Aer-O-Torq recess for high torque strength has been announced by Aer-O-Line Mfg. & Supply Co., 3110 Winona Ave., Burbank, Calif. Because the recess requires less metal for a given driving torque, there's less metal in the heads. Get details from the company, or Circle Inform-A-Gram No. P28.

RX FOR INTERNAL INSPECTION

● 0.10" AND UP . . . That's the point of entry requirement . . . to provide your inspectors the chance to use the outstanding National Fontar Borescope and thus give them the brightest, distortion-free, close-up view of the defect in "inaccessible" interior surfaces of the cast, drawn, welded or molded product . . . from inches deep to many feet.

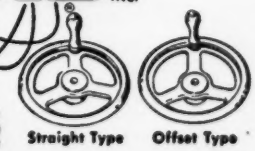
Find out how its use can be a time and cost saver while it up-grades your Quality Control. Just send for our "Borescope Catalog."

ENGELHARD HANOVIA, INCORPORATED
NATIONAL ELECTRIC INSTRUMENT DIVISION
92-21 CORONA AVENUE • ELMHURST 73, NEW YORK

CIRCLE INFORM-A-GRAM KEY NO. 1151

TOMCO INC.

HAND WHEELS



SPECIALS

- HAND KNOBS
- MACHINE HANDLES
- HANDLES
- BALL HANDLES
- LEVERS
- SPECIALTIES

GRADUATED DIALS

SPECIFY TOMCO FOR DEPENDABILITY

A Complete line of high grade hand knobs, levers, handles, hand wheels, graduated dials is available for immediate shipment from stock of standard items. Specialty items made to your specifications.

WRITE FOR INFORMATION

TOMCO INC. Racine 2, Wis.

CIRCLE INFORM-A-GRAM KEY NO. 1152

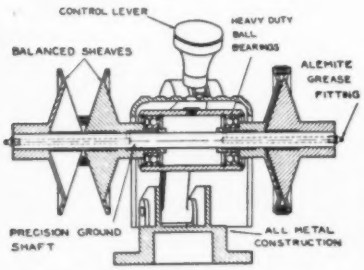
Regardless of Cost..... You Can't Get A Better Variable Speed Transmission

Fractional to 5 hp. at 1750 rpm. Ratios to 10 to 1. Lever (shown) or handwheel control.

Lovejoy

SELECT-O-SPEED

- Inexpensive compared to other infinitely variable speed transmissions.
- As easy to install as an ordinary V-Belt drive.
- Uses standard V-Belts.
- Infinitely variable over wide speed ratio up to 10:1.
- Changes speed quickly while machine is running.
- Compact—all metal—balanced sheaves—large ball bearings.
- Minimum wearing parts—no expensive replacements.
- Lubrication needed at only three points.

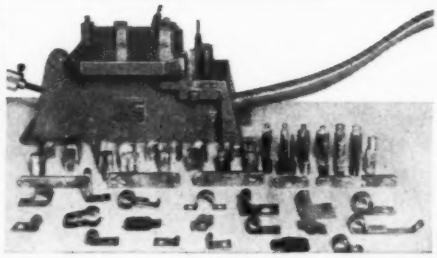


This cut-away sketch shows the practicality and simplicity of the Select-O-Speed's design. Nothing complicated, just two variable pitch sheaves mounted on a pivoted shaft. No internal mechanism—no intricate parts. Shifting the control lever causes a momentary variation in tension between the driving and driven belts which changes the sheave pitch diameters and the driven speed.

Get the facts about the Select-O-Speed. Tell us about your application. We'll give you our recommendations. Request Bulletin 118.

LOVEJOY FLEXIBLE COUPLING CO.
4859 W. Lake St., Chicago 44, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 1161



Multiform

BENDER-CUTTER

CUTS, BENDS, PUNCHES

Available in hand, air or hydraulic models. The MULTIFORM is shipped complete with full assortment of dies and mandrels to form and cut round or flat stock up to ⅛" x 1½" as illustrated. Punching dies available. Other models up to ½" x 8" hydraulic operated. Ideal for steel rule die forming.

WRITE FOR DESCRIPTIVE CIRCULAR

ALSO AIR OPERATED MODELS

J. A. RICHARDS COMPANY KALAMAZOO, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 1162

JIG BORING

and

Large Precision Machining

Done to your specifications

We Have

22 Jig Borers

KIDDE PRECISION TOOL CORPORATION
10 Locust Ave., Roseland, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 1163

CHROMELLOY

In minutes produces 61-65 RC case on carburizing steels. Case has exceptional resistance to impact and abrasion. Easy and safe to use—No cyanide. Requires no special equipment.

U.S. Metallurgical Laboratories, Inc.
50 E. 41st St., New York 17, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1164

PRECISION VERNIER

LAYOUT COMPASS

Invaluable for laying out circles and radii—for template layout and optical comparator charts. Two sizes: 6" and 12". Reads to 1/1000". In case including Phono-needle points and scribers. 6"—$21.80. 12"—$39.80.

DIAL CALIPER

Deeply engraved graduations. Knife jaws for inside-outside measurement. Precision built from stainless steel and brass for lifetime dependability. 4 Models: 6" — $39.00, 8"—$42.00, 12" — $59.80, 24" — $108.30.

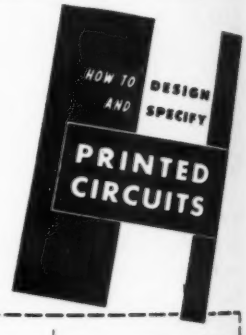
Dealer inquiries invited. *Write for literature.*

TITAN TOOL SUPPLY CO., Box L, 1419 Hertel Avenue, Buffalo 16, N.Y.

CIRCLE INFORM-A-GRAM KEY NO. 1165

How to Design and Specify

PRINTED CIRCUITS



OVER 70 ILLUSTRATIONS are included in this new publication, reporting on: Advantages of Printed Circuits . . . Layout and Design . . . Selection of Materials and Components . . . Multiple Soldering Techniques . . . Reliability . . . Production Methods . . . Process Limitations . . . Printed Circuit Assembly . . . Service and Repair . . . Artwork . . . Finishes . . . Information on Switch Plates and Commuter Discs . . . and other valuable information. Also includes NEW RECOMMENDED TOLERANCES FOR PRINTED CIRCUITS. $5.00

HUEBNER PUBLICATIONS, INC.
P. O. BOX 3505, 1975 LEE ROAD, CLEVELAND 18, OHIO

Please send ..... copies of "PRINTED CIRCUITS" at $5.00 each postpaid. Ten day examination allowed; returnable for full credit or refund if returned in saleable condition.)

Company .....

By..... Title.....

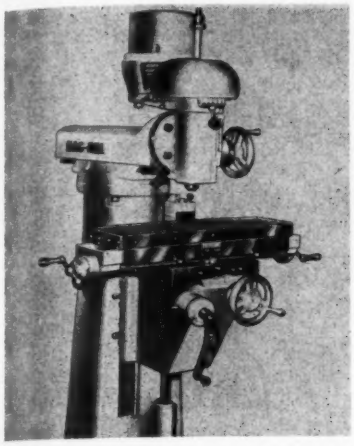
Address .....

City..... Zone..... State.....

Open account shipments to rated companies. Otherwise, payment with order, please. No C.O.D.'s. Ohio customers add 3% sales tax.

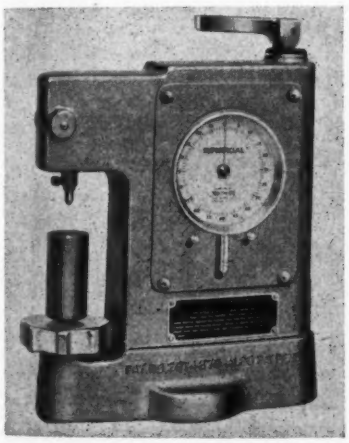
Product News

Built-In Magnetic Table



Eliminate time-consuming bolting and clamping to hold the workpiece by using the Mag-Mill vertical milling machine with built-in magnetic table. It has a reversing switch to demagnetize the table and a 7″ x 27″ working surface. Get details from Hanchett Magna-Lock Corp., Dept. TP7, Big Rapids, Mich., or Circle No. P29.

Direct-Reading Hardness Tester



A new portable hardness tester, with direct-readings of Rockwell scales and accuracy maintained to ± half-point, is announced by Northern Manufacturing & Engineering Co., 2500 N. Main St., Rockford, Ill. It weighs only 6½ lb and has 3″ vertical capacity and 3″ horizontal reach. It'll handle 95% of all shop and lab testing. For details, Circle No. P30.

Vertical Gage

A 4″ direct-reading vertical gage has an 0 to 4″ range from a master glass scale which is optically subdivided into 0.000025″. The heavy stand permits an optical increase of the measuring range to 8″ by resetting to a 4″ gage block. For details, write Opto-Metric Tools, Inc., 137 Varick St., New York 13, or Circle No. P31.

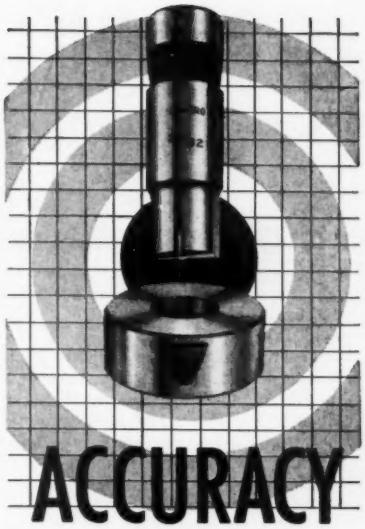
Safety Lift Hooks

Unlimited load maneuverability with safety is offered by the new built-in swivel feature of the heavy duty safety lift hooks. Used with overhead cranes, the new

swivel feature permits dies to be maneuvered 360° around the swivel while the attaching bolt remains securely tightened. Contact Mentor Products, Inc., Mentor, Ohio, for details, or Circle Inform-A-Gram No. P32.

Metalworking Lubricant

A free sample of a special metalworking lubricant that eases extreme stresses to which tools and work are subjected in stamping and machining operations on hard-to-work metals is offered by Anchor Chemical Co., 10719 Briggs Rd., Cleveland 11. Anchorlube is clean, odor free, and harmless to the skin. Get sample and details from the company, or Circle Inform-A-Gram No. P33.



ACCURACY ASSURED

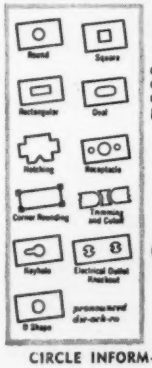
WITH DI-ACRO PRECISION PUNCHES AND DIES

Immediate Delivery from factory stock

Accurate hole location is easily achieved with Di-Acro Precision Punch and Die sets because the centering point on the punch is ground concentric to the cutting edges, there is no "slop" even when several holes are punched in a blank. Hole sizes are accurate due both to the high degree of concentricity of the punch and die set and the choice of clearance which allows you to obtain clean, burr free holes no matter what material thickness is to be perforated. All Di-Acro punches and dies are precision made of high quality tool steel.

For multiple hole punching ask us about the new Di-Acro Adjustable Punches and Dies.

Over 500 standard sizes of Di-Acro Precision Punches and Dies in 12 standard styles are stocked. Punch Adapters and Die Holders are available to fit all styles of punch presses.



Consult the Yellow Pages of your phonebook under Machinery—Machine Tools for the name of your Di-Acro distributor or write us for catalog and price list.

di-acro PRECISION METALWORKING EQUIPMENT

O'NEIL-IRWIN MFG. CO.

315 Eighth Avenue

Lake City, Minnesota

CIRCLE INFORM-A-GRAM KEY NO. 1171

PUSH BUTTON *Speed Selection*

from **to** **in seconds**

or to *any* intermediate speed, *instantly*

Just push a button and watch the large tachometer dial on the headstock!

It's that easy!

The work is done by a motor driven speed changer. It accelerates or slows the lathe to any desired speed in seconds. With a 10:1 ratio, this new variable drive makes it easy to select from a wide range of speeds—200 to 2000 rpm in direct drive and 40 to 300 rpm in back gear.

Maximum stability and smooth power transmission are assured because the drive unit is oversized. All pulleys and shafts are fully supported (eight bearings). Double V-belts throughout the drive eliminate slippage and deliver full power to the spindle. Because of this rigidity and extra pulling power, this lathe will take heavy cuts at all speeds and precision finish cuts at high speeds.

It is a precision lathe, moderate in price, with the versatility for toolroom, production or second operation jobs.

SHELDON *Variable Speed* PRECISION LATHES

Illustrated
WM56P
13" Swing- 34" Centers
Base Price F.O.B. Factory

Write for
"Variable Speed" Circular and General Catalog showing . . .

- 10", 11", 13" and 15" SHELDON Precision Lathes (Bench, Pedestal and Cabinet types)
- 13" and 15" SEBASTIAN Geared Head Lathes
- SHELDON Milling Machines
- SHELDON Back Geared Shapers

SHELDON MACHINE CO., INC.
4235 N. Knox Avenue. • Chicago 41, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1181

FREE

Catalog service for *busy buyers*

BUYERS . . . who want or need immediate data on a specific piece of production room equipment will find these DURANT specialized catalogs of invaluable assistance.

- ☐ Automatic Roll Feeds
- ☐ "Sure-Drive" Coil Cradles
- ☐ Ambi-Trip 2 hand Press Control
- ☐ Stock Straighteners
- ☐ Scrap Choppers
- ☐ Small Tools
- ☐ Automatic & motor driven Stock Reels

ALL ARE FREE . . . just check off the ones you want and mail this ad along with your name and address.

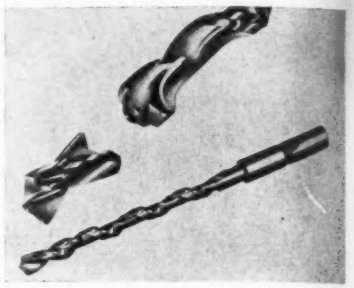
DURANT TOOL COMPANY
17 THURBERS AVENUE • PROVIDENCE 5, R. I.

CIRCLE INFORM-A-GRAM KEY NO. 1182

Product News

Throw-Away Tipped Drills

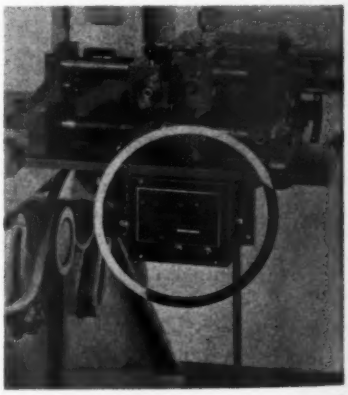
This new type of oil hole drill, the Bi-Tip drill, features two flute replaceable tips available in carbide tipped, solid tungsten carbide, or solid high speed steel. After



repeated sharpenings have expanded usable cutting tip area, a new tip can be brazed to the undamaged body at a fraction of original drill cost. For details, write Detroit Reamer & Tool Co., 780 W. Maple Rd., Birmingham, Mich., or Circle Inform-A-Gram No. P34.

Automatic Sequence Counter

This new sequence counter allows the air feed at a press to advance the stock from one to seven times before the press is tripped.



It can be wired directly into an air clutch control panel or can, with the addition of an air cylinder, operate a mechanical clutch press. For details, write Cooper-Weymouth, Inc., 600 Honeyspot Rd., Stratford, Conn., or Circle Inform-A-Gram No. P35.

MEIER WEARITE®
extruded aluminum bronze

for wear plates, strike plates, wear strips, ways and gibs, cam slides, lathe beds, wipers for roll forming.

SIZE: 97 rectangular sizes 1/4" to 3" thick and 1" to 6" wide.

QUALITY: Tough (210–310 Brinell); strong (105,000 psi ultimate yield); and smooth surfaces with excellent wear characteristics.

MACHINING: Extruded WEARITE is free from porosity, and inclusions and has a homogeneous structure, improving machineability.

COST: MEIER WEARITE COSTS LESS in pound for pound of usable metal than cast wear strips.

Write for technical folder or test sample at no cost.

Meier BRASS & ALUMINUM Company

1471 E. NINE MILE RD.
HAZEL PARK, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1191

Punches and Dies

New Catalog Now Ready!

Send for FREE Copy!

Write for our new Catalog No. 161AF, illustrating our standard punches and dies. It also illustrates and describes our complete line of modern sheet metal fabricating equipment. Net prices are shown.

●

This 84 page reference book is free to sheet metal fabricators and all users of punches and dies. Worth having handy.

WARD Machinery Co. 564 West Washington **Chicago 6**

CIRCLE INFORM-A-GRAM KEY NO. 1192

SPECIALISTS IN

Carbide Tipped and Solid Carbide CUTTING TOOLS

It costs no more to enjoy the production advantages of MEYCO tools: "precision" minded since 1888, careful workmanship, well equipped shops and capable design engineers . . . all add up to plus values for you.

The finest quality and proper grade of tungsten carbide is engineered to the cutter's job. Tools are precision ground and lapped for long life, tipped to carefully machined bodies balanced for rigidity. MEYERS works to tolerances of .0001", tipped cutters as thin as .030", solid carbide cutters much thinner, diameters of ¼" and up.

Your special problems in the field of cutting, slitting, slotting, under-cutting or form-cutting are solicited.

Write for new Cutter Catalog No. 51

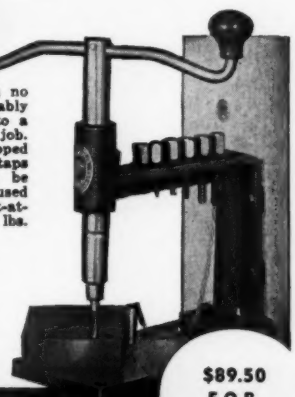
MEYCO **W. F. MEYERS CO., Inc.**
BEDFORD, INDIANA
A famous name in precision tools since 1888

CIRCLE INFORM-A-GRAM KEY NO. 1193

The Quick, Easy, Handy Way to TAP BY HAND

. . . Adapts for LATHE USE

THE DAHLSTROM TAP GUIDE virtually eliminates tap breakage—and saves those costly hours spent prying broken taps out of dies. Anyone can use it. Just a few turns of the spindle and the job is done.



Winds through continuously, with no backoff. Work is always dependably straight and square. Fasten it to a post or set it on top of a big job. This handy tapper comes equipped with 9 adapters, 8-32 to ¾" but taps are not furnished. Spindle can be pulled out and used in a lathe, or used as tap extension for hard-to-get-at-places. 13" x 8" x 14", wt. 32 lbs.

Also Makers of Dahlstrom Autostrop and Tap Chuck
Send for bulletin

BRANCH MFG. CO.
16 Olson Drive
NORTH BRANCH, MINN.

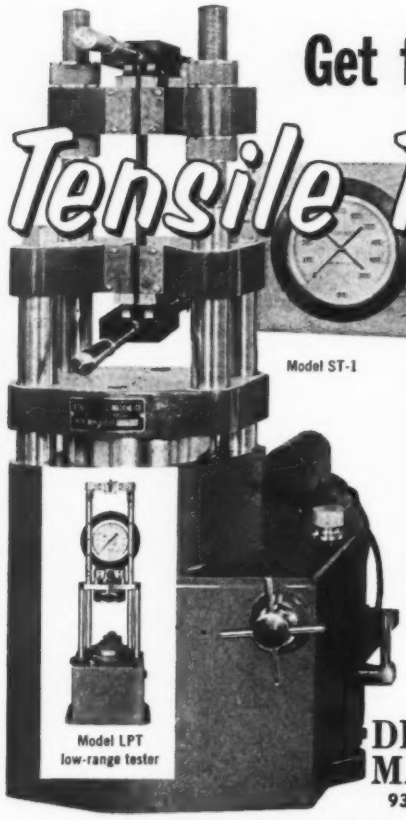
Dahlstrom **TAP GUIDE** — **$89.50 F.O.B. Factory**

CIRCLE INFORM-A-GRAM KEY NO. 1194

Get fast, accurate

Tensile Testing

hydraulically



Hydraulically powered Detroit tensile testers put you in command of every phase of the test. Self-acting, open-sided specimen grips permit easy specimen insertion. Constantly controlled hydraulic rams apply up to 40,000 pounds, smoothly and quickly. Special load gauges, grips, or other modifications gladly supplied.

Write today for more information about our tensile testers

DETROIT TESTING MACHINE COMPANY
9386 Grinnell Avenue, Detroit 13, Mich.

SEE US AT BOOTH 1946 AT THE METAL SHOW
CIRCLE INFORM-A-GRAM KEY NO. 1201

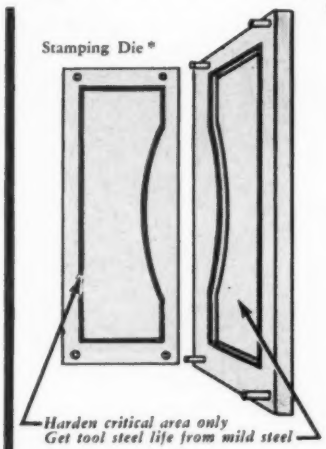
EXTRA HARDNESS Where you want it

In One Quick Operation

Carburize, Nitride and Chromize *Simultaneously* . . . easy as 1, 2, 3.

1. *Heat part (even with a torch) and apply HARD-N-TUFF powder to desired area only.*
2. *Reheat.*
3. *Quench.*

Stamping Die *



Harden critical area only
Get tool steel life from mild steel

Use HARD-N-TUFF on dies, fixtures, cutting tools. . . on any cutting edge, bearing or impact surface.

* *HARD-N-TUFF gave one manufacturer 500,000 stampings before reconditioning die.*

✓ EASY ✓ NON-TOXIC ✓ FAST ✓ ECONOMICAL

It's the surface hardness that counts!

HARD-N-TUFF

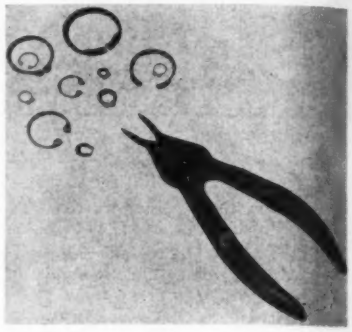
Ask your Industrial Distributor for full details, or write direct to:
HARD-N-TUFF CORP.
P.O. Box 275, Huntington, L.I., N.Y.

CIRCLE INFORM-A-GRAM KEY NO. 1202

Product News

Convertible Field Pliers

For a wide range of internal and external type retaining rings use Truarc No. 12 convertible field pliers. A simple adjustment per-



mits the tool to be set so that the tips come together or spread apart when the handles are compressed. Write Waldes Kohinoor, Inc., 47-16 Austel Pl., Long Island City 1, N.Y., or Circle No. P36.

Versatile Clamp System

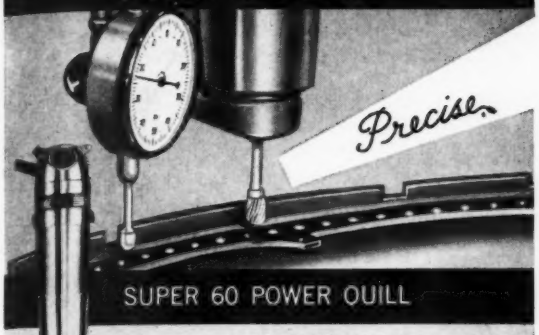
Only six standard components in Industrial Specialties Inc.'s unique and versatile line can be assembled into 32 different styles of clamps.

They're easily assembled with spline-fit torque pins and snap rings and are easy to re-make or repair. For details, contact the company at 22930 Sherwood, Warren, Mich., or Circle Inform-A-Gram No. P37.

YOUR INFORM-A-GRAM CARD FOLLOWS PAGE 70 IN THIS ISSUE.

It is for your convenience when making inquiries.

FOR PRECISION MACHINING
TO CLOSE TOLERANCE



SUPER 60 POWER QUILL

High speeds combined with high torque make PRECISE Super-Speed POWER QUILLS the finest tools for precision grinding, milling, and finishing. They can be quickly mounted—with PRECISE mounts—on standard and special machine tools to do the work of single-purpose machines costing many times more.

PRECISE Super 60 POWER QUILL provides spindle speeds up to 45000 rpm with a ½ hp motor and operates from ordinary 110v or 220v power supplies. Its rigid steel housing, precision spindle, and collet chuck permit work tolerances to within .0001 inch. Other models available from 7000 rpm to 45000 rpm with power ratings to 1½ hp. Send for complete catalog.

Precise

Power Quills Grinder Millers Milling Machines Accessories Cutting Tools Vapor-Lub Cooling Systems
Quality and Precision Since 1882

PRECISE PRODUCTS CORPORATION
3741 BLUE RIVER ROAD, RACINE, WISCONSIN, U.S.A.
Branch Plant: PRECISE G.m.b.H., Duesseldorf, Germany

CIRCLE INFORM-A-GRAM KEY NO. 1211

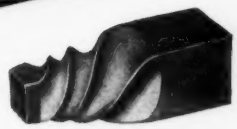
Specialized TOOLS that Rate a place in your Tool Crib

TAP EXTRACTORS
Remove broken taps; no drilling; no delays; no damaged threads. Production range of sizes.

"Multi-Position" TOOL HOLDER
Head adjustable to eight positions, including straight, right or left offset.

PIPE, STUD AND SCREW EXTRACTORS
Hardened steel makes strong, four-point, pulling grip.

TAP EXTENSIONS
For both hand and machine operation. Style "B" illustrated.



The cost of Walton Specialized Tools is negligible compared with the labor and time cost that they save. A Walton Tool readily at hand is insurance against lost time. Try them at our expense in your shop . . . and rate them for a place in your tool crib.

Write for Data *Folder No. 38*

WALTON TOOLS SINCE 1908 HARTFORD, CONN.

THE WALTON CO. HARTFORD 10, CONN.

CIRCLE INFORM-A-GRAM KEY NO. 1213

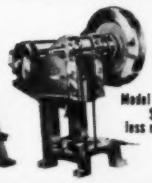
ALLEN
Heavy Duty
PUNCH PRESSES

Powerful
Dependable and Economical
Fully Guaranteed

Moderate in Price

See your Supply Dealer or write for Catalog giving complete information, specifications and prices on our line of Heavy Duty Punch Presses.

Hundreds of different Model Combinations 1 to 25 ton Capacities



Check the Yellow Pages of Your Phone Directory

Thousands in use the World over

ALVA ALLEN INDUSTRIES, Dept. TP
CLINTON, MISSOURI · Telephone TUrner 5-3331

CIRCLE INFORM-A-GRAM KEY NO. 1212

Why suffer rejects . . . needlessly?

Replace guesswork gaging with "honest-tenth knowledge" and

WATCH

REJECTS

GO

DOWN!

COMTORPLUG

- Tells operator actual hole size to fraction of .0001".
- Shows him front or back taper, barrel shape, bell mouth, ovality, etc.
- Unique patented expanding plug principle gives uniformly accurate 2-point gaging, automatically aligned, centered and pressured.

Because it makes the operator "master of tenths," Comtorplug is now the production control gage in hundreds of fast-moving programs: jet engine, household appliance, automotive transmission, high-speed machinery, etc.

SEND FOR BULLETIN 50 →

COMTOR COMPANY, 82 Farwell St., Waltham 54, Mass.

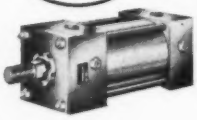
COMTORPLUG

CIRCLE INFORM-A-GRAM KEY NO. 1214

depend on S-P for speed and performance with trouble-free operation

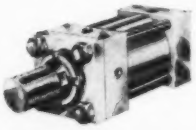
Standard Air or Oil Cylinders

Feature brass tubes to eliminate corrosion; precision honed for smooth dependable power at low or high speeds. Rated 200 psi air, up to 500 psi oil or water; 23 mounting types; 11 bore sizes: 1½" through 14". Full data in Catalog 110C.



Air-Oil Boosters

Uses line air to provide intensified hydraulic power, easy to vary and control for many production operations; need no maintenance, hold intensified pressure as long as need with no added power consumption; save air, space. Full data in Catalog 116.



High-Pressure Hydraulic Cylinders

Ruggedly built for smoother, more precise power; interchangeable; 23 mounting styles; 12 bore sizes—1⅛" thru 12"; Rated: 2000 psi (3000 psi non-shock). See Catalog 117.

Heavy-Duty Air-Hydraulic Cylinders

Proven for automation, widest use; air or hydraulic—no modification; extra large ports for extreme high speeds, minimum pressure drop. Rated: 200 psi air; 1000 psi hydraulic; 9 bore sizes—1½" thru 8". See Catalog 115.

ALSO
- CONTROL VALVES
- DRILL PRESS CHUCKS
- EXPANDING ARBORS
- PARALLEL GRIP COLLET CHUCKS
- ACCESSORIES

A-2617A

Power Chucks

S-P Self-Centering and Compensating Chucks are installed as original equipment by leading manufacturers. Ruggedly built for increased speeds, heavier feeds with greater grip; 2 or 3 jaws; American Standard or serrated; sizes — 6" to 18". Write for Catalog 112.

Rotating Cylinders

Original equipment on famous machine tools. Bore sizes for air: 3" through 16". For hydraulic: 3" through 8" and larger. Speeds up to 3600 R.P.M. Send for catalogs —air or hydraulic.

THE S-P MANUFACTURING CORPORATION
A BASSETT COMPANY • ESTABLISHED 1916
30201 AURORA ROAD • CLEVELAND 39, OHIO

Find us fast in the 'Yellow Pages'

CIRCLE INFORM-A-GRAM KEY NO. 1221

free!

NEW 1960 CATALOG

MONTGOMERY TOOLS

128 TIME SAVERS FOR TOOL MAKERS

MONTGOMERY & CO., INC.
405 Morris Avenue
Springfield, N.J. DRexel 6-4767

Drill Press Tooling
Adjustable short-run drill jig
Self-centering air vise
Combination tapping/deburring tool

Lathe Tooling
Ball-turning tool for concave and convex radii
Quick-change tool holders for turret work on standard lathes

Surface Grinder Tooling
Jaws for holding non-magnetic material on magnetic chucks

Milling Machine Tooling
Vise with automatically contouring jaws for any odd shape work

Inspection Tools
Thread Triangles for simplified measuring of pitch diameter

Plus many more cost-cutting tools for toolroom, and production line

Write for your free copy.

CIRCLE INFORM-A-GRAM KEY NO. 1222

Product News

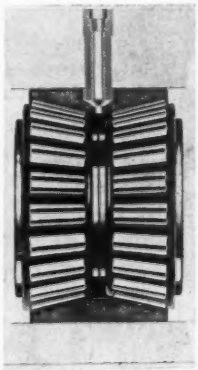
Positive Reverse Driver

Quadrill four and five position turret drilling heads now have a positive reverse driver that makes it possible to tap directly off of

any spindle. However, their use is restricted to drill presses equipped with a reversing motor. Write Chicago Quadrill Co., 1846 Busse Highway, Des Plaines, Ill., for information, or Circle Inform-A-Gram No. P38.

Pin-Type Bearings

Designed to be dimensionally interchangeable with conventional Timken double cup bearings, new Pin-type bearings will enable ma-



chine builders to use these new bearings with minimum changes to existing designs. Contact The Timken Roller Bearing Co., Canton 6, Ohio, for details, or Circle Inform-A-Gram No. P39.

PALMGREN

NEW "All Purpose" DRILL PRESS TABLE

that permits
(without removing piece from table)

DRILLING
MILLING
GRINDING
INDEXING
on any popular size bench or floor model drill press

One compact unit with cross-feed, rotary and angle adjustments for thousands of difficult operations IN ONE SETTING without duplicating set-up time.

Get more accurate work, greater production, FASTER, with this new PALMGREN 500 drill press table. Installed in seconds, this table converts your present drill press into an efficient and sturdy milling machine. Get the facts on this new No. 500 Drill Press Table TODAY.

Send for this new FREE catalog on Work Holding Tools now.

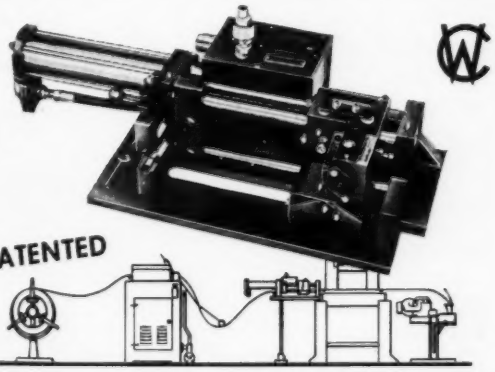
133

Models available for all popular sizes and makes.

PALMGREN PRODUCTS

8388 SOUTH CHICAGO AVE. • CHICAGO 17, ILL. Phone SAginaw 1-9675

CIRCLE INFORM-A-GRAM KEY NO. 1231



air operated slide feeds

The proven, low-cost way to get increased output and efficiency from your present stamping and shearing equipment. Ideal automatic operation even on short runs and frequent changeovers.

Simple, versatile, self-contained — operates from standard air lines — install directly on press bolster — simple air valve and cam timing — quick, accurate single-screw feed adjustment — open throat construction handles widest range of stock widths — nine sizes, with strokes to 24", for flat or irregular stock to 3/16" thick and 30" wide in lighter gauges.

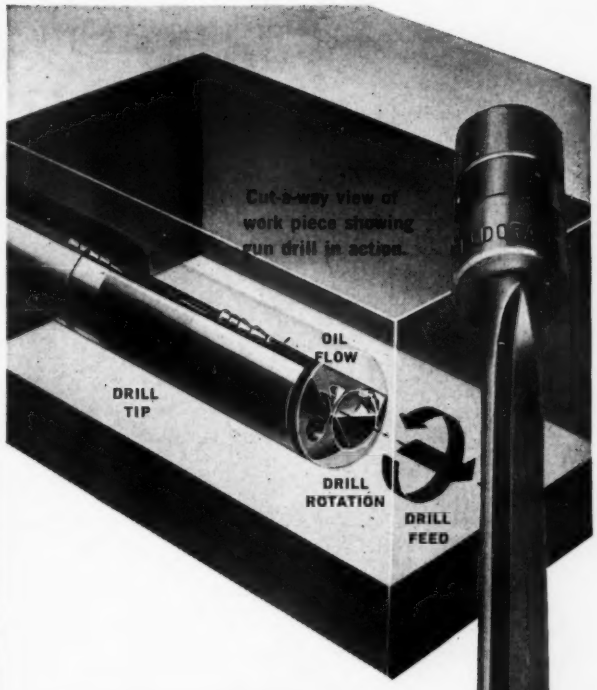
FOR A FULLY AUTOMATIC STAMPING LINE

also ask about Cooper Weymouth combination cradles and straighteners, stock reels, stock and wire straighteners, scrap choppers and small parts straighteners.

COOPER WEYMOUTH, INC.

603 Honeyspot Road, Stratford, Conn.

CIRCLE INFORM-A-GRAM KEY NO. 1232



ELDORADO* GUN DRILLS

DRILL HOLES

more economically... more efficiently, with controlled surface finish.

Drill straight, round, accurately finished holes at high speeds... through solids, blow-holes, hard spots and across-holes, in one single operation.

If you are now using gun drills, it will pay to find out how ELDORADO can cut your costs, give you improved hole finish. Chances are there's an ELDORADO Gun Drill in stock for you. Avail yourself of ELDORADO's experience and research facilities to answer your 'hole' problem.

Send for NEW LITERATURE on Gun Drills and Gun Reamers.

ORDER STOCK SIZES FOR IMMEDIATE SHIPMENT. TO SPECIFICATIONS, ON NORMAL DELIVERY.

MADE TO YOUR SPECIFICATIONS:		AVAILABLE FROM STOCK:	
Sizes	.1250" to 2" dia.	1/8" to 1/2" dia. in 64ths	1/2" to 3/4" dia. in 32nds
OA Lengths	4" to 120" with dia. limits	10", 16", 22", 36"	16", 22", 36"
Drivers	Std. or to fit your need	.750" dia. x 2 3/4" long	1" dia. x 2 3/4" long
Tips	Carbide	Carbide	Carbide
Now, order from stock, or send in your specifications for a prompt quotation.			

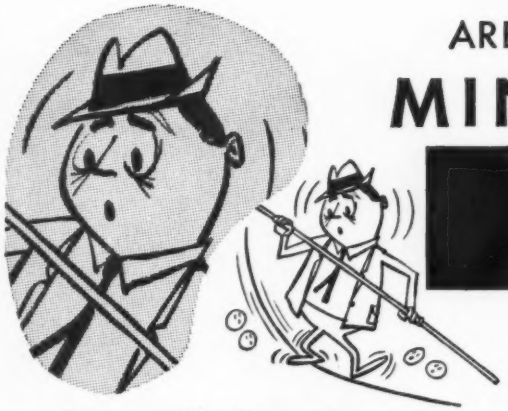
Specializing 100% in Gun Drills and Related Tools.

ELDORADO TOOL & mfg. corp.

* Trade Mark

356 Boston Post Road • Milford, Conn.

CIRCLE INFORM-A-GRAM KEY NO. 1233



ARE YOU PROPERLY GEARED FOR

MINIATURIZATION?

SMALL DRILLS MUST BE HELD IN PRECISION COLLETS TO ASSURE ACCURACY

A super-sensitive drill press in which drills are held in precision collets to eliminate chucking errors. Table is keyed to prevent any play. Feed is by raising table. No quill to cause drag.

LEVIN ®

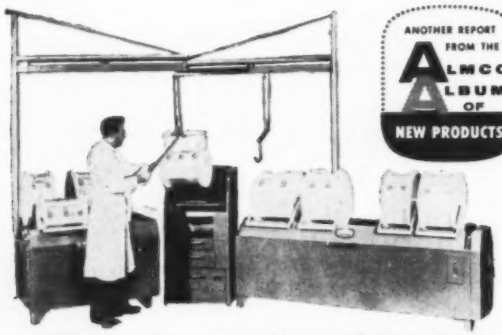
MICRO DRILL PRESS

FOR VERY SMALL HOLES DOWN TO .002"

For complete details of Micro-Drilling equipment send for catalog T.

Louis Levin & Son, Inc.
3610 So. Broadway
Los Angeles 7, Calif.

CIRCLE INFORM-A-GRAM KEY NO. 1241



ANOTHER REPORT FROM THE ALMCO ALBUM OF NEW PRODUCTS

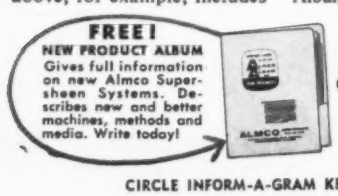
NOW... low-cost barrel finishing with NEW ALMCO ROLL BARRELS!

● Better product parts through use of modern barrel finishing can now be yours... *at a fraction of previous time and cost!*

New low-cost ALMCO Supersheen Roll Barrels provide greater deburring and finishing capacity in less floor space than do small standard barrels . . . and they're more adaptable, too.

Roll Barrel System shown above, for example, includes Multi-Roll "36", Multi-Roll "78", time-saving loading cabinet, and easy-to-use hoist boom. Nine different barrel sizes provide wide range of speeds and capacities. Using only one barrel or many, one man operates entire system.

For Full Story on Roll Barrel Systems and on processing sample parts, write for ALMCO Album of New Products...*today!*



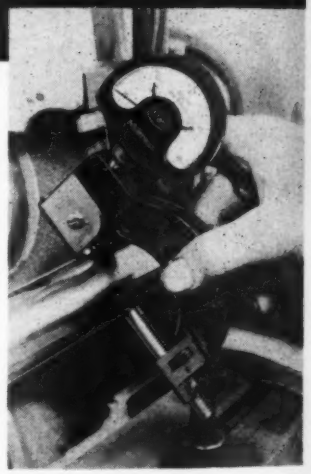
FREE!
NEW PRODUCT ALBUM
Gives full information on new Almco Supersheen Systems. Describes new and better machines, methods and media. Write today!

ALMCO
QUEEN PRODUCTS DIVISION
610 E. Main St.
Albert Lea, Minnesota

CIRCLE INFORM-A-GRAM KEY NO. 1242

INDICATING SNAP GAGE

with SUPER SENSITIVE GAGING HEAD made by Mahr



ONE SNAP DOES IT

- Makes GO and NO GO gages obsolete.
- Eliminates operator "feel".
- Reads directly to 50 Millionths, 20 Millionths or ½ thousandths with interchangeable gaging heads.
- Available in 5 sizes for work from 0 to 8 inches.

Determine at a glance whether your work is within the tolerance limits. Just set the limits on the INDICATING SNAP GAGE, retract the tungsten carbide measuring faces, with one finger, and let it "SNAP." You can SEE the exact amount of material left to be removed. Ask for folder #125.

GUARANTEED (Mahr) QUALITY

AT YOUR FAVORITE SUPPLY HOUSE OR WRITE TO

MAHR GAGE CO.

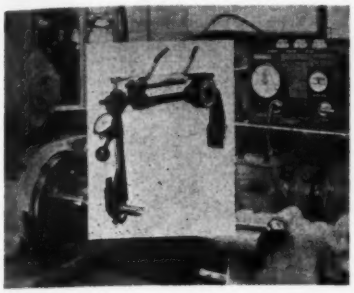
274 Lafayette Street • New York 12, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1243

Product News

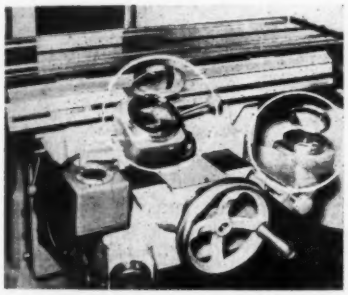
Hydraulic Actuator

Here is a new hydraulically operated device for automatic positioning and retraction of continuous grinding gage. It increases both the output and quality of plunge-



grind operations because it allows the operator to control two or more machines at a time. For details on the Federal - Arnold Actuator, write Federal Products Corp., 1144 Eddy St., Providence 1, R. I. or Circle No. P40.

Direct-Reading Positioning Gage



The Vernac, an easy-to-use direct-reading optical measuring instrument with no moving parts, indicates the longitudinal, lateral, or vertical position of any machine tool table. It can be read to an accuracy of 0.0001" without interpolation by means of a scale affixed to a machine tool table. For details, write Simpson Optical Manufacturing Co., 3200 W. Carroll Ave., Chicago 24, Ill., or Circle Inform-A-Gram No. P41.

THE INFORM-A-GRAM CARD IS FOR YOUR CONVENIENCE IN MAKING INQUIRIES ABOUT ADVERTISED PRODUCTS AND EDITORIAL ARTICLES.

WHAT MEN AND MACHINES AT LENNOX CAN DO FOR YOU

- Design and build precision machinery
- Build machinery to your design
- Design and build special machinery and tooling to your specifications
- Production machine work: Machining and grinding
- Manufacture sub-assemblies and complete units
- Machine tool rebuilding

Contact us Today — No Obligation

LENNOX

TOOL AND MACHINE BUILDERS
637 N. BAXTER ST., LIMA, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1251

WHY WAIT? IMMEDIATE DELIVERY!

LARGEST STOCK OF
SPECIAL RH & LH Taps-Dies & Thread Plug Gages

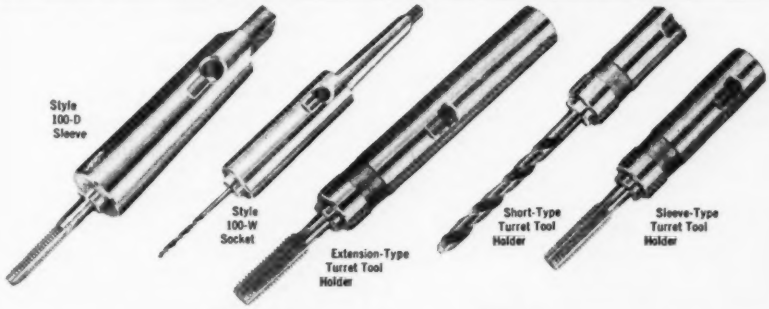
Also in Stock:
- RING GAGES • ACME & METRIC TAPS & DIES
- SPECIAL REAMERS
- EX. LONG DRILLS

Write Today for WALL CHART Special Taps Also Made to Your Print Specifications

Quotations on Request

FIELD TOOL SUPPLY CO.
Industrial Cutting Tools
31 S. DESPLAINES ST., CHICAGO 6, ILL.
All Phones: Financial 6-1195

CIRCLE INFORM-A-GRAM KEY NO. 1252



precision sleeves, sockets, holders, cut "unavoidable" accuracy loss

Why sacrifice accuracy when tooling up machine tools?

Scully-Jones precision sleeves, extension sockets, and turret tool holders are made of Stressproof steel. Hardened at wear points to maintain accuracy, resist wear, and give long, trouble-free service.

Inside and outside tapers of *sleeves* and *turret tool holders* are concentric within .002". O.D. hardening gives maximum strength — guards against nicking, a major cause of runout.

Extension sockets have hardened hole and tang-ends. Shanks and taper holes are concentric within .002".

Keyhole-type drift slots (above) accommodate "Scully-Drift" tool ejectors, permit fast tool changes, help avoid spindle damage.

Your Scully-Jones representative or distributor can tell you all about these and other *precision holding* tools.

Scully-Jones and Company
1913 South Rockwell Street, Chicago 8, Illinois

Tool Ejector

"Scully-Drift"
Twist-of-the-wrist cam action ejects tool—stops hammering and resultant damage to spindles, bearings, and tools.

SCULLY JONES **SLEEVES AND SOCKETS**

CIRCLE INFORM-A-GRAM KEY NO. 1253

WHEN IT COMES TO REPEAT HOLDING OPERATIONS THEY ALL AGREE . . .

Machinist, tool engineer, purchasing agent, and production manager all agree that Graham is America's number one machine vise.

Why? It's as simple as this. *Machinists* know that a vise doesn't have to weigh a 'ton" to be tough—do a rugged job. So they appreciate Graham's light weight, compact construction, and accuracy. The *tool engineer* appreciates accuracy too, but he's also interested in the fact that Graham's versatile attachments eliminate the need for many custom jigs and fixtures. Production managers also want to cut costs and they know that Graham equipment is so easy to change from one job to another, *set-up time is cut by 30%.*

As for purchasing—these men have found that Graham is competitively priced and made to provide a lifetime of uninterrupted service.

Graham is the only vise with a complete set of interchangeable jig attachments (that eliminate the need for many custom jigs and fixtures). And there's a model for every job, a size for every requirement. There are also swivel-base models (360° rotation) and self-centering (for quick positioning regardless of size variations).

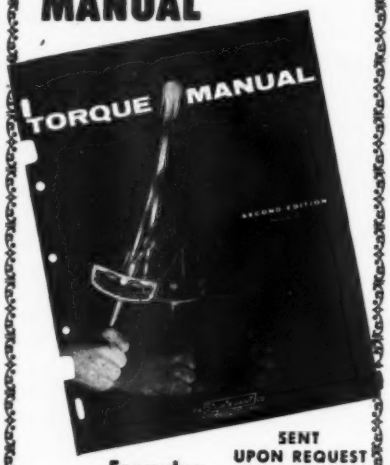
There are the facts, the reasons why all men concerned with the selection of machine tools specify Graham Multi-Purpose Machine Vises—and have for over fifty years.

For complete specifications and prices . . . .

THE GRAHAM MFG. CO., INC.
East Greenwich, Rhode Island

CIRCLE INFORM-A-GRAM KEY NO. 1261

"TORQUE WRENCH" MANUAL



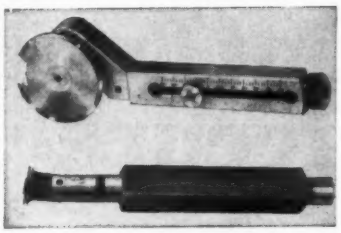
SENT UPON REQUEST

Formulas
Applications
Engineering Data
Screw Torque Data
Adapter Problems
General Principles

P.A. STURTEVANT CO.
ADDISON QUALITY ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1262

THREAD Cutting Tool



Provided with a scale for angular setting.

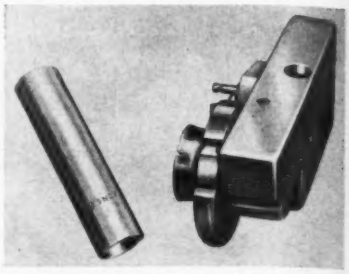
Circular Cutter, in high speed or carbide, has a negative profile and machines both thread flanks simultaneously. Thread cutting discs for all threads are available for both external and internal tool holders.

ACME TOOL CORP.
71 West Broadway,
New York 7, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1263

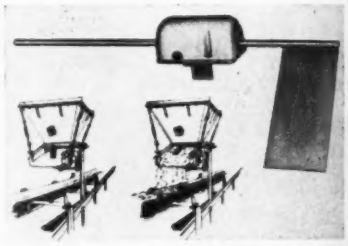
Product News

Screw Machine Marker



The new Rol-A-Matic is a precision automatic screw machine attachment for marking round, hollow or solid stock. It can be attached to either front or rear cross-slide and operation is simple because it consists of only two moving parts. For details, write Sossner Steel Stamps, Inc., 161 Grand St., New York 13, N.Y., or Circle Inform-A-Gram No. P42.

Flow Switch

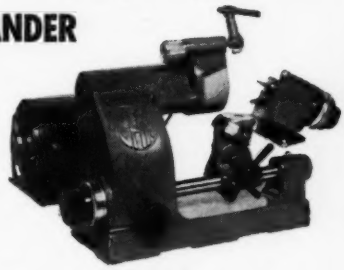


A Flap on the new Model FS-1 flow switch is deflected by the flow of material past it. When the flow stops, the flap swings back and actuates a signal or starts corrective action. It can be used in feeder and conveyor troughs, bins, bunkers, hoppers, and chutes. For data, write Syntron Co., 341 Lexington Ave., Homer City, Pa., or Circle Inform-A-Gram No. P43.

Spring Producing Line

The Baird Machine Co. has announced a new line of spring manufacturing machines following acquisition of this line from The Clay Engineering & Mfg. Co. This line fills the need for a new machine capable of producing completed springs in a single operation as opposed to machines in current operation which merely coil the spring and require end forming operations to be performed on additional machinery.

Accurate Cutter Sharpening With ALEXANDER Bench Grinders



Handles Extremely Small Radii

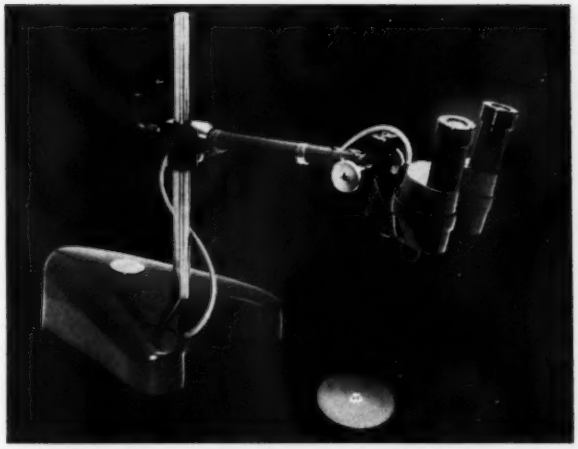
This Cutter Grinder provides precision forming of all single-lip cutters and tracing styles to any predetermined profile or cutting angle—on symmetrical or off-set radii. Work head is mounted on bar slide which permits coarse and fine longitudinal adjustments, and controlled oscillating movement. Two swivel bearings in work arm allow further vertical and horizontal adjustment. Collet attachment on index head accepts cutters up to ½" dia. Optional diamond wheel dressing attachment. Prompt delivery.

Write for catalog on ALEXANDER Cutter Grinders, Die Sinkers and Engraving Machines.

J. ARTHUR DEAKIN, INC.

31 ROSELAND AVE. CALDWELL, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 1271



STERIMAG

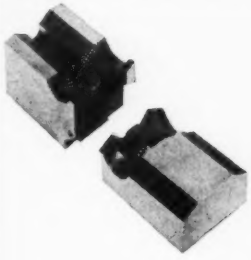
Crystal sharp stereoscopic image
Built-in focusable light source
Long 7" working distance — wide field
Stable base with universally adjustable mounting
Fixed magnification 10X and 20X models each **$165**

COOKE TROUGHTON & SIMMS INCORPORATED
91 WAITE STREET, MALDEN 48, MASSACHUSETTS
IN CANADA: 77 GRENVILLE STREET, TORONTO

CIRCLE INFORM-A-GRAM KEY NO. 1273

HURON

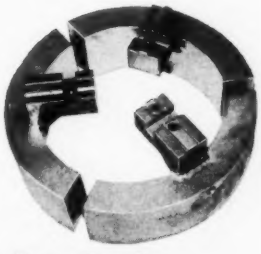
SPECIAL Soft-Blank Top Jaw



Immediate delivery on Standards

Special Soft-Blank Top Jaws made to your specification upon request. HURON TAKES GREAT PRIDE IN DELIVERIES. Special Soft-Blank Top Jaws are no exception and delivery WILL BE MADE to meet with your request. Send your specifications and requirements today for a quotation.

Immediate delivery from stock on standard Soft-Blank Top Jaws. Standard jaws may be used on any chuck having master jaws. Both medium and heavy duty styles are carried in stock and made from 1020 steel.



Write today for Free Catalog

HURON MACHINE PRODUCTS, INC.

P. O. BOX 2274 DEARBORN, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1272

YOUR SPECIAL CUTTING TOOL PROBLEMS ARE SOLICITED.

You are welcome to our 25 years experience in designing and producing Special Cutting Tools.

Submit your problem— with sample part, if feasible OR we'll manufacture to your specifications.

Thousands of Severance SPECIAL CUTTERS shipped monthly!

ASK FOR A QUOTATION TODAY!

MIDGET MILLS

CHATTERLESS COUNTERSINKS

BALL SEAT REAMERS

CARBIDE END MILLS

INSIDE DEBURRING CUTTERS

OUTSIDE DEBURRING CUTTERS

TUBE END DEBURRING CUTTERS

CARBIDE HAND FILES

HAND DEBURRING CUTTERS

DISC CUTTERS

DRILL COUNTERSINKS

ELECTRODE DRESSING CUTTERS

REGRINDING SERVICE

Severance TOOL INDUSTRIES INC.
730 IOWA AVENUE
SAGINAW, MICHIGAN

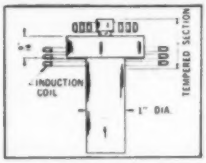
CIRCLE INFORM-A-GRAM KEY NO. 1274

Lepel

HIGH FREQUENCY INDUCTION HEATING UNITS

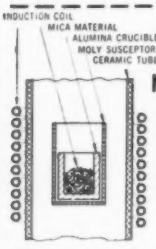
Lepel induction heating equipment represents the most advanced thought in the field of electronics . . . the most practical and efficient source of heat developed for numerous industrial applications. You are invited to send samples of work with specifications. Our engineers will process and return the completed job with full data and recommendations without cost or obligations.

TYPICAL INDUCTION HEATING APPLICATIONS



Punch Heads Selectively Tempered

Diagram shows arrangement for selectively tempering heads of alloy steel punches. The use of a combination type solenoid and pancake induction coil reduces hardness from Rc 55/56 to Rc 41/44, improving resistance to brittle fracture at the head of the punch. In this case a heating cycle of 55 seconds provides uniform tempering. A multiple position fixture, processing 4 pieces at one time, speeds up production.



Heating Non-Conducting Materials To High Temperatures

Laboratory analyses frequently require heating of non-conducting materials to temperatures of 3,000 to 3,500° F. in vacuum or special atmosphere. This can be accomplished by induction heating with the aid of a metal susceptor. Diagram shows the fusion of mica samples in an alumina crucible, using molybdenum susceptor. A ceramic tube surrounding the susceptor isolates the work for fusion in a vacuum. The molybdenum susceptor is heated by induction, which in turn, heats the crucible by radiation.

WRITE FOR NEW LEPEL CATALOG
Electronic Tube Generators from 1 Kw to 100 Kw.
Spark Gap Converters from 2 Kw to 30 Kw.

LEPEL HIGH FREQUENCY LABORATORIES, INC.
55th ST. & 37th AVE., WOODSIDE 77, N. Y.

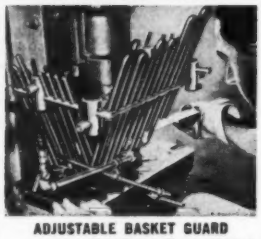
Chicago Office: 6246 W. North Ave.

CIRCLE INFORM-A-GRAM KEY NO. 1281

SEARJEANT SAFETY GUARDS

SINGLE SWEEP GUARD

For Punch Presses



ADJUSTABLE BASKET GUARD

Fit Any Press

30-Day Free Trial

GUARDS DESIGNED AND MADE BY SEARJEANT

- ADJUSTABLE BASKET
- SINGLE SWEEP
- DOUBLE SWEEP
- END ZONE BARRIER
- NON-REPEAT MECHANISM
- MILLING MACHINE
- FLYWHEEL AND BELT
- TWO PUSH BUTTON ELECTRO-SOLENOID OR ELECTRO-PNEUMATIC CONTROLS
- ELECTRO-SOLENOID OR ELECTRO-PNEUMATIC DROP GATE GUARDS

SEARJEANT Metal Products Inc.
No. 14 Pittsford Road, Mendon, New York

CIRCLE INFORM-A-GRAM KEY NO. 1282

FREE

EMPLOYEE MOTIVATION KIT

Includes:

- MULTI-COLOR DISPLAYS
  QUALITY WORK
  WASTE REDUCTION
  INJURY PREVENTION
- SUPERVISORY GUIDANCE
  "CREATIVE THINKING"
  "MOTIVATION STUDY"
- 50 PAGE PLANNING GUIDE

This valuable kit is yours without obligation. Simply fill out the coupon and mail it today.

ELLIOTT SERVICE COMPANY, INC.
Mount Vernon, New York

ELLIOTT SERVICE COMPANY, INC.
Dept. T, Mount Vernon, N. Y.

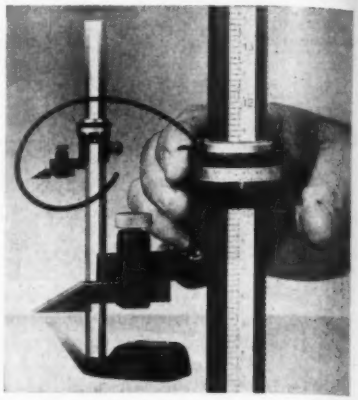
Please provide me with the Elliott "Employee Motivation Kit."

Name .....
Title .....
Firm .....
Address .....
City ..... Zone... State.....

CIRCLE INFORM-A-GRAM KEY NO. 1283

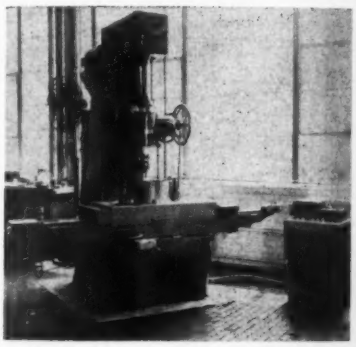
Product News

Accurate Height Gage



A low-cost precision height gage, accurate to within 0.0005″ per 12″, has been introduced by Speedline Sales Co., 12860 Fisk Ave., Warren, Mich. At least four times faster than vernier-type gages, this model is clearly calibrated for split-second direct readings. Standard sizes are 14″ and 20″. Contact Speedline for details, or Circle Inform-A-Gram No. P44.

Accurate Numerical Control



Production accuracy of up to ±0.0002″ on a 40″ work table, flexibility achieved through modular design, and economy are advantages of a newly-developed numerical control system. The Singer system comprises two basic functional sections — data processing and response mechanism. Contact Diehl Mfg. Co., Somerville, N.J., for more data, or Circle Inform-A-Gram No. P45.

Protect Your Future
BUY
U. S. Savings Bonds
Today!

STANDARD ZAGAR Gearless DRILL HEADS

DRILL ANY NUMBER OF HOLES IN ANY PATTERN IN ANY MATERIAL ON ALL CENTERS

Write for Manual T-10

Drill a maximum number of holes in one pass—in any material. Holes can be as close as twice drill diameter. Zagar gearless drillheads are built as a complete unit or may be adapted to any standard drill press. Send us your part drawing and we will submit our quotation.

23894 LAKELAND BLVD. • CLEVELAND 23, OHIO

Zagar INCORPORATED

USE MORE SPINDLES TO DO MORE WORK

CIRCLE INFORM-A-GRAM KEY NO. 1291

Better Steel Think about Rule Dies!

Save up to 90%

FOR SHEARING, BLANKING, PUNCHING, PIERCING

YOU CAN MAKE STEEL RULE DIES FASTER, BETTER, CHEAPER WITH RICHARDS STEEL RULE DIE-MAKING EQUIPMENT!

Build steel rule dies in your own plant! Production cost and waiting time go down when Richards Equipment goes to work for you! More and more progressive manufacturers are turning to steel rule dies for faster, higher-profit work on all types and gauges of metal.

Richards' fifty years of experience as pioneer manufacturers of steel rule die-making equipment and supplies provides you with a complete service.

J.A. Richards Company

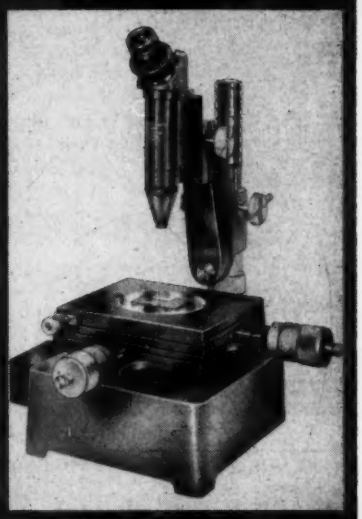
NORTH PITCHER STREET • KALAMAZOO, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1292

Leitz New SIMPLEX TOOLMAKERS MICROSCOPE

YOU GET A COMPLETE TOOLMAKER MICROSCOPE of 2" x 2" range in .0001" at a basic price of $1045. Compare this outstanding value.

Request catalog 81/155



OPTO-METRIC TOOLS, INC.

137 TP VARICK STREET • NEW YORK 13, N.Y.

CIRCLE INFORM-A-GRAM KEY NO. 1293

Now ready:

Manual of Machinability and Tool Evaluation

by ANTONI NIEDZWIEDZKI
Machining Consultant

TYPICAL CHAPTER COVERAGE: Tool Life Formulas . . . Tool Life Criterion . . . Chip Load and Workpiece Hardness . . . Tool Geometry . . . Test Records . . . Tool Inspection . . . Machinability Classification . . . Machine Tool Selection.

The Manual contains a wealth of examples and forms for Development Sheets . . . Recommendation Sheets . . . Crossed Charts . . . Tool Life Tables . . . Graphs and Drawings . . . covering work with Carbides and HSS on Cast Iron and Steel.

This is a reference book and is wire bound to lie flat at any page for easy reference.

ORDER YOURS TODAY!

★ ★ ★

USE COUPON

10-DAY EXAMINATION ALLOWED.

Manual is returnable for full credit or refund if returned in saleable condition.

HUEBNER PUBLICATIONS, INC.
P. O. BOX 3505, 1975 LEE ROAD, CLEVELAND 18, OHIO

Gentlemen: Please ship as soon as possible .... copies of MACHINABILITY AND TOOL EVALUATION at $6.00 per copy.

Company .....

By..... Title.....

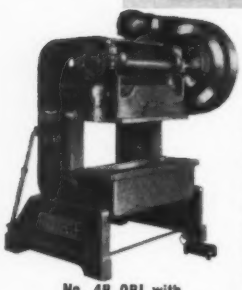
Address .....

City..... Zone..... State.....

Open account shipments to rated companies. Otherwise, payment with order, please. No C.O.D.'s. Ohio customers add 3% sales tax

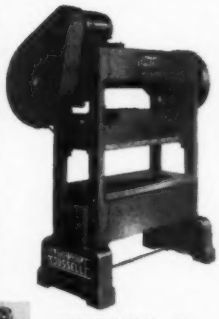
High-Output with ROUSSELLE

DOUBLE-CRANK PRESSES



No. 4B OBI with "Econo-Air" clutch.

SPEED UP PRODUCTION with these versatile 40-ton presses. Large bed and ram areas make them ideally suited to handle wide rolls or sheets . . . do multiple punching, steel-rule die work and other high output operations. For rapid, shockless starting and stopping, presses can be equipped with electrically controlled "Econo-Air" friction clutch . . . Ask for new catalog.



Choice of over 30 models and types in 5 to 60-ton sizes

STRAIGHT SIDE – Die space up to 24 in.; bed space up to 6 ft. between uprights.

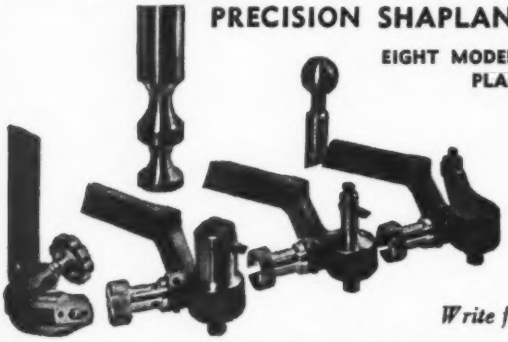
SERVICE MACHINE COMPANY
Mfrs. of Rousselle Presses
2310 WEST 78TH STREET • CHICAGO 20, ILLINOIS

Rousselle Presses are sold exclusively through Leading Machinery Dealers.

CIRCLE INFORM-A-GRAM KEY NO. 1301

PRECISION SHAPLANE RADIUS TOOLS

EIGHT MODELS FOR LATHES, SHAPERS, PLANERS AND BORING MILLS



Range: ⅛" to 3" for concave radii on lathes. Two sizes for convex radii (Balls up to 2½" dia.) on lathes. Also heavy duty model for radii to 6" on planers, etc.

Write for circular

Patent Pending

C. B. TEETER - Tool Room Specialties

3443 N. Greenview Ave., Chicago 13, Illinois • Phone DRexel 3-3571

CIRCLE INFORM-A-GRAM KEY NO. 1302

DYKEM STEEL BLUE

Stops Losses making Dies and Templates

Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead

THE DYKEM COMPANY
2303L North 11th St. • St. Louis 6, Mo.

CIRCLE INFORM-A-GRAM KEY NO. 1303

6¾" x 6¾" Wet Cut

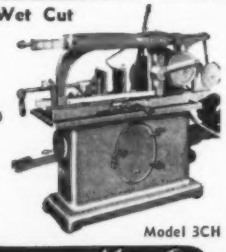
KELLER
POWER
HACKSAW

ONLY $498.00

Complete with motor and switch F.O.B. Factory

•

Ask your Industrial Distributor or write



Model 3CH

Sales Service Mfg. Co.

2361 University Ave., St. Paul 14C, Minn.

CIRCLE INFORM-A-GRAM KEY NO. 1304

LIFTING DEVICES

for
FAST • SAFE • BETTER
Material Handling
of
• SHEETS
• COILS • BOXES
• MOLDS
• DRUMS • PALLETS
400 MODELS

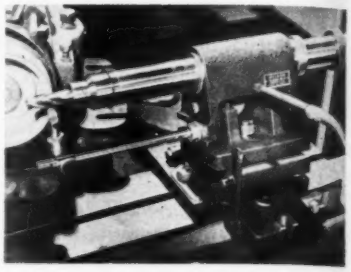
H. L. BUSHMAN CO.
100-A W. Central Ave.
Roselle, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1305

Product News

Sharpening Fixture

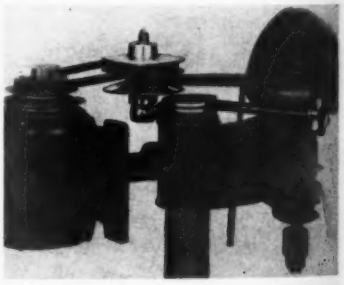
A new end mill sharpening fixture features an air-bearing spindle which minimizes friction and assures maximum operator control. It mounts directly on the table of any make tool grinder. The spindle handles 3/16" to 1¼" dia end mills. For details, write The



Weldon Tool Co., 3000 Woodhill Rd., Cleveland 4, or Circle Inform-A-Gram No. P46.

Instant Speed Variator

The Ratex instant speed variator permits you to change machine speeds instantly without stopping the motor. A variable speed range of 6½:1 ratio is obtainable with fingertip control. The unit is quickly and simply installed, and fits any standard 2¾" drill press support post without the use of tools. It can be installed in other positions when angle brackets are



used. For details, write Custanite Corp., 1228 Utica Ave., Brooklyn 3, N.Y., or Circle Inform-A-Gram No. P47.

YOUR INFORM-A-GRAM CARD FOLLOWS PAGE 70 IN THIS ISSUE

91

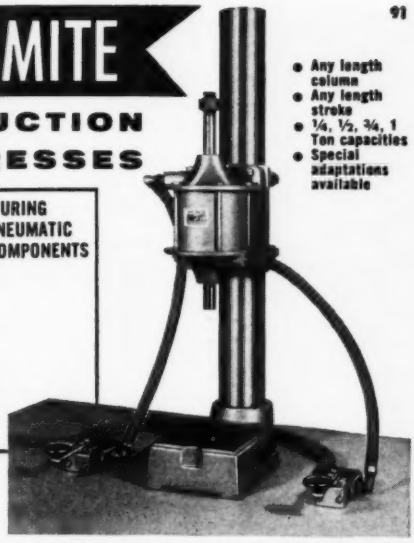
AIR-MITE

PRODUCTION AIR PRESSES

- Any length column
- Any length stroke
- ¼, ½, ¾, 1 Ton capacities
- Special adaptations available

ONE MANUFACTURING SOURCE FOR PNEUMATIC AUTOMATION COMPONENTS

- Cylinders
- Presses
- Valves
- Filters
- Regulators
- Lubricators
- Fittings
- Hose



Air-Mite Production Air Presses are ruggedly built for high production applications. Solid steel column for greater strength and rigidity; compact, powerful cylinders have long, maintenance-free construction features that insure uninterrupted service. Available with a variety of controls for fast, safe operation. Press shown is equipped with two Air-Mite 3-way valves — 1 normally "closed", 1 normally "open." Cylinder will not return for second stroke unless both valves are released.

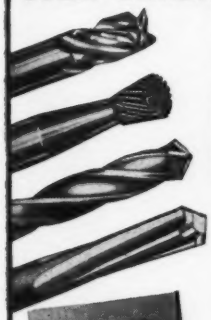
Write for complete Air-Mite catalog which illustrates and describes the Air-Mite line.

AIR-MITE DEVICES, INC.
4405 A W Kinzie St., Chicago 24, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 1311

"Raymac"

SOLID CARBIDE CUTTING TOOLS

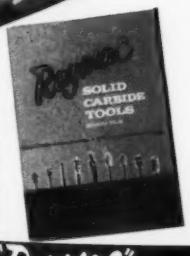


- MIDGET BURRS • ROTARY FILES
- DRILLS • REAMERS • END MILLS
- COUNTERSINKS • GRINDING TOOLS AND OTHER SPECIAL TOOLS

Up to 25% Longer Life

Finest quality solid carbide ground and lapped to the sharpest cutting edges make "Raymac" tools the quality standard of the industry. More parts produced per tool and per regrind.

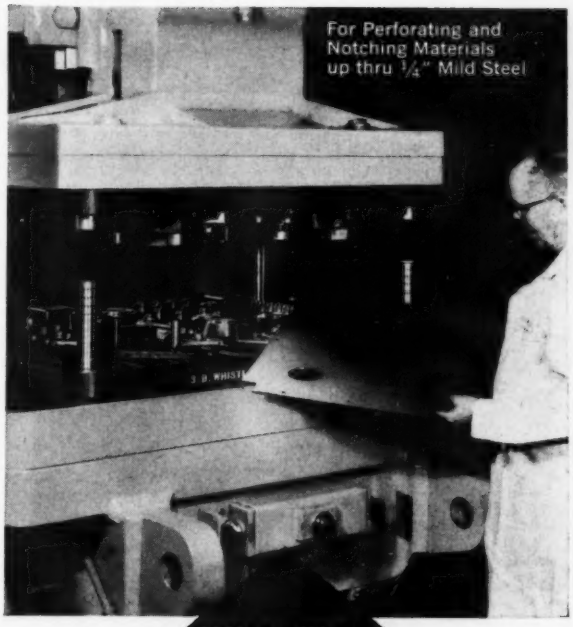
Make "Raymac" your standard.



SEND FOR NEW CATALOG NO. 61

"Raymac" Division – DEXCO CORPORATION
15778 Telegraph Rd. Detroit 39, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 1312



WHISTLER ADJUSTABLE DIES

save thousands $$$ in tooling costs

Interchangeable punch and die parts are readily arranged on Tee-Slot die sets. The same parts can be used again and again in different groupings. You profit in numerous ways:

- Even new workers can quickly learn to make pattern changes.
- Tooling costs cut to rock bottom.
- Precise accuracy assured.
- Punches and dies stocked in .001" increments from .100" to .500" diameters. Larger sizes in stock up to 3".

S. B. WHISTLER & SONS, INC.
748 Military Road, Buffalo 23, N. Y.

MAIL the following:

☐ Adjustable Die Catalog ☐ Magna-Die Catalog ☐ Custom Die Bulletin

NAME TITLE

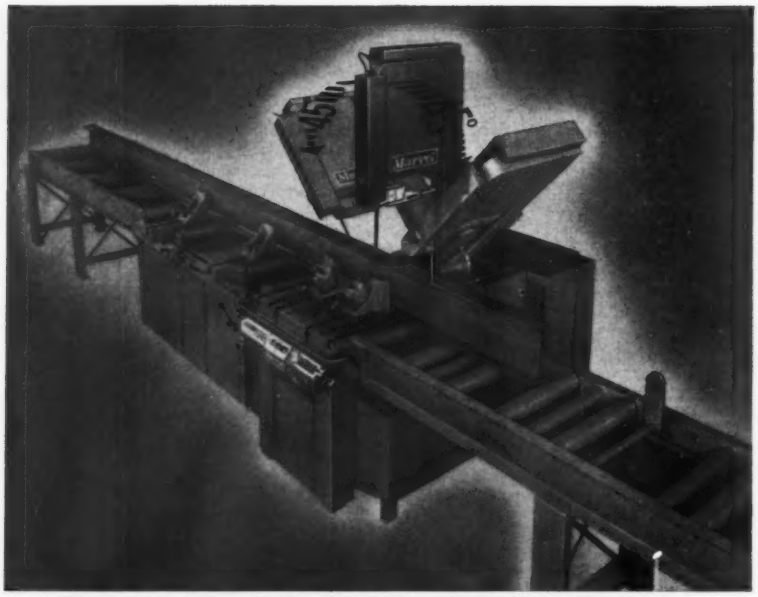
COMPANY

STREET

CITY ZONE STATE

GET THE TIME AND MONEY SAVING STORY ON WHISTLER PRODUCTS:
magnetic dies • adjustable dies • custom dies

CIRCLE INFORM-A-GRAM KEY NO. 1313



Tips Its Head To Cut Production Corners

Sawing 45° miters in any kind of material has always been a simple task for MARVEL Saws, but moving the work up automatically and making consecutive cuts on an angle was a problem, especially when the work was long and cumbersome.

This triple exposure photograph of a new MARVEL No. 81A All Hydraulic Heavy Duty Automatic Bar Feed Band Saw, illustrates how the upright head or column can be tipped 45° either right or left of vertical to make angle or miter cuts. The work is held stationary while the column, which carries the blade, is fed forward, meeting the work squarely to insure accurate cutting. After the cut is completed, the work is automatically moved up and measured, and another cut made.

Automatic miter cutting is just one of many exclusive universal features of these band saws. Designed to utilize every advantage of high speed steel band blades, MARVEL No. 81 Series Band Saws can handle almost any conceivable sawing job—from the smallest, most delicate work, up to 18" x 20" shapes.

Only the MARVEL No. 81 Band Saws have the "SURE-LINE" Automatic Accuracy Control (basic patent applied for) which literally steers a blade to make a straight cut. This unit extends usable blade life as much as 50%.

MARVEL No. 81 Series Band Saws are proving themselves daily, as the most versatile machine tools in production metalworking plants.

For complete details, or a demonstration of MARVEL Sawing Equipment, write: Armstrong-Blum Manufacturing Co., 5700 W. Bloomingdale Ave., Chicago 39, Ill.

MARVEL Metal Cutting SAWS

CIRCLE INFORM-A-GRAM KEY NO. 1321

WALTER PRECISION ROTATION

THE COMPLETE LINE OF

Precision Rotary Dividing Equipment

MODEL Rt/TG (illustrated)

TWO SERIES: Standard or Super-Accurate.

MODELS: Rotary, Tilting-Rotary and Horizontal-Vertical Rotary.

READABILITY: To 2 seconds.

AVAILABLE WITH Dividing Discs and/or Degree Graduations.

· Send for FREE Catalog of all Walter Dividing Tables, Heads and Accessories including Test Reports.

Sole Agents for U.S.A. **KARL A. NEISE, Inc.** Dept. TP, 404 4th Ave., N.Y. 16, N.Y.

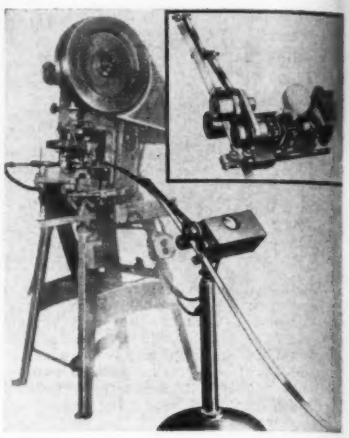
NEISE MODERN TOOLS

CIRCLE INFORM-A-GRAM KEY NO. 1322

Product News

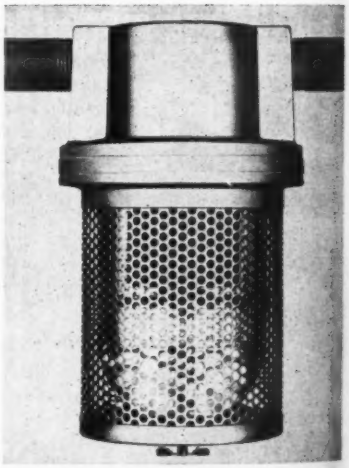
Positive Mechanical Stop

"Feed-Off," a completely mechanical unit instantly stops a machine if length of stock per stroke drops below a pre-set minimum, if



stock varies in thickness, if defects occur in stock, and when coil end approaches. It's portable and can be quickly and easily installed. For details, write Rand Products, Inc., Dep't 4F, Willimantic, Conn., or Circle No. P48.

New Bowl Guards



New guards for plastic bowls on Crown filters and lubricators have been announced by Hannifin Co., Dept. 164, Des Plaines, Ill. They afford maximum protection against injury if the bowl should break. Get details from Hannifin, or Circle Inform-A-Gram No. P49.

TRIAL SAMPLE!

SPECIAL LUBRICANT EASES WORKING STAINLESS AND TOUGH METALS

New lubricant eases stamping and machining operations on the toughest metalworking jobs—takes the problems out of hard-to-work metals such as stainless, high carbon, high chrome, cast iron, monel, etc. Scientifically developed ANCHORLUBE now used extensively in a wide range of applications—drilling, tapping, spot facing, counter-boring, milling, fly-cutting, seat forming, engraving, broaching, drawing, piercing, punching, hole extruding, etc. Application by swab, spray, roller or brush. Send today for free trial sample and see for yourself how easy you can work the job with ANCHORLUBE.

ANCHOR CHEMICAL COMPANY
Dept. TP-10 • 10721 Briggs Rd. • Cleveland 11, O.

CIRCLE INFORM-A-GRAM KEY NO. 1131

low cost
HYDRAULIC KEYSEATER
cuts standard, tapered keyways ¼" to 2" wide

- fast set-up—saves time and money
- low cost operation-uses standard tool bits
- heavy-duty hydraulic circuit—assures accurate keyways
- compact, 21" x 61"—no special foundation

Send for Bulletin 34

E. W. BLISS COMPANY
CANTON, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1133

Every Shop Should Own One

No distortion—
even on ⅛" stock!
MODEL "C"

KNURLMASTER Hand Knurler

For small production runs on ⅛" to 1" stock. Exclusive screw design gives perfect knurl pattern. Furnished with 3 hardened straight or diamond pattern knurls of standard ½" dia. Forged steel frame is self-centering. Write for illustrated folder.

ROCKWIN MANUFACTURING CO.
80A MAGNOLIA AVE., WESTBURY, L.I., N.Y.
CIRCLE INFORM-A-GRAM KEY NO. 1132

ANNOUNCING NEW Sixpac KITS OF NIAGARA CARBIDE FACE MILLS

Six carbide tip face mills with 3/4" integral shanks paired in 1½", 2" and 2½" sizes. Cabinet with cushion liner combines convenience and protection. Paired sizes provide spares to cut down-time. Satisfaction guaranteed. Ask for Catalog 6-PK-566. **$115** With Cabinet

Also Mfrs. of Standard, Special and Modified Tools.

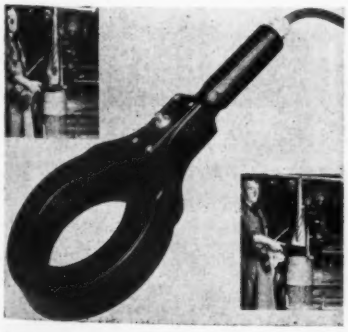
NIAGARA CUTTER

Division of Bollier-Damerell, Inc.
338 Niagara Street N. Tonawanda, New York

CIRCLE INFORM-A-GRAM KEY NO. 1134

Handy Demagnetizer

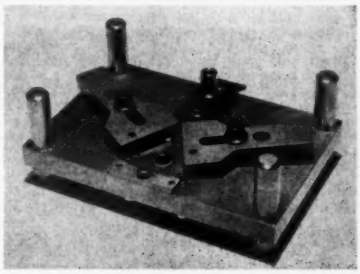
The Bux Han-D-Mag is a new lightweight demagnetizer that's particularly useful for demagnetizing tools and small parts. It will also demagnetize the visible portion of drill press spindles. It plugs



into any 110 v a-c line. For details, contact Bux Magnetic Products, Inc., 1355 N. 10th St., San Jose 12, Calif, or Circle No. P50.

Stainless Steel Tooling

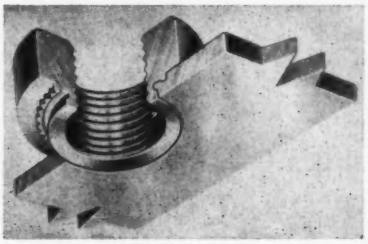
An Expanded line of stainless steel tool components for use in all precision machine jig, test fixture and tool design applications is announced by PIC Design Corp., 477 Atlantic Ave., East Rockaway, L.I., N.Y. Complete assemblies and individual parts including clamps, dogs, studs, spacers, washers, jig buttons, legs, heel pins, springs and precision ground plates are



available from stock in a wide range of types and sizes. Write the company, or Circle P52.

New P-Nut

An inexpensive method of obtaining load bearing threads for later bolt or screw fastening in thick or thin ductile sheet metal is easily accomplished by using the P37 P-Nut. The newest press-in



type product has tensile strength that exceeds that of 200,000 psi bolt. Get Brochure 2-1424 from Hi-Shear Rivet Tool Co., 2400 W. 247th St., Torrance, Calif., or P51.

Two-In-One Tap Driver

A new double-action tap driver is for use on multiple-spindle machines which take adjustable-adapter shank tools. It compensates for a difference in the feed of the spindle and the lead of the tap,

and can be used both as a tension and a compression-type driver. Get details, from Seibert & Son., Inc., Chenoa, Ill., or Circle P53.

CUMULATIVE EDITORIAL INDEX FOR 1960 ISSUES

TOOLING & PRODUCTION Magazine

The number of subjects in which T&P's editors present material in just a few issues adds up very rapidly. Most articles are of lasting interest and have future reference value in solving tooling and production problems.

This cumulative index will build up progressively during each calendar year. Each issue will carry a cumulative index of material contained in all previous issues of the same year, with each January issue carrying the complete index of the twelve issues of the previous year.

We suggest you see to it that your copies of T&P are retained for future reference so you can get the full benefit of this useful index.

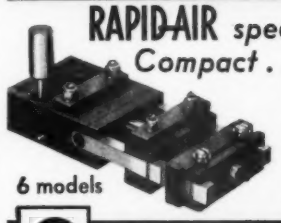
The Publisher

SUBJECT INDEX

Assembly
Q-C for, Feb., p. 66 (3 pp.)
Automation
Inevitability of, July, p. 8 (2.1 pp.)
Boring
Cartridge-type tooling, with, Feb., p. 53 (2.4 pp.)
Chip removal, after, Feb., p. 43 (.66 p.)
Head for boring mill, Sept., p. 114 (.66 p.)
Methods and machines, special engineering report on, June, p. 56 (11.34 pp.)
Tool and gage setup for accuracy in, May, p.61 (2 pp.)
Broaching
Progressive blind hole, on a press, Sept., p. 65 (1.45 pp.)
Progressive, tooling for, June, p. 51 (1.33 pp.)
Carbides
Cartridge-type, for boring and facing, Feb. p. 53 (2.4 pp.)
Common sense use of, Feb., p. 49 (1 p.)
Machining hi-temp alloys with, Feb., p. 51 (1.9 pp.)
Machining tungsten with, Feb., p. 56 (3 pp.)
Throwaway tools, positive rake chip-breaker grooves in negative rake inserts, for doubled life, Apr., p. 62 (1.0 pp.)
Use of, Feb., p. 9 (1.16 pp.)
Ceramics
Machining with, June, p. 48 (2.9 pp.)
Milling with, Sept., p. 64 (1 p.)
Cold Forming
Heading, fast, of tiny parts, Feb., p. 65 (.7 p.)
Swaging, choosing a machine, Feb., p. 59 (3 pp.)
Swaging, feeding a rotary machine, July, p. 49 (2.76 pp.)
Swaging, tooling for, May, p. 59 (3 pp.)
Controls
Numerical, at Machine Tool Exposition, Aug., p. 39 (1 p.)
Numerical, filtration of hydraulic systems for, Sept., p. 59 (2 pp.)
Numerical, programming for drilling, Apr., p. 58 (4.0 pp.)
Numerical, retrofitting of, Aug., p. 9 (1.65 pp.)
Tape, and common sense, Jan., p. 35 (1 p.)
Tape, for milling machine, Jan., p. 48 (2-1/2 pp.)
Tape, of Natco drill, to speed production, Mar., pp. 55 (2 pp.)
Computers
Operation of, for production jobs, Jan. p. 43 (5 pp.)
Cost Cutting
Calculator for, in high efficiency machining, Sept., p. 68 (1 p.)
How new machines can aid, Aug., p. 60 (1 p.)
Production change, by, Feb., p. 46 (.4 p.)
Design
Nut tapping machine, of, Aug., p. 47 (2.26 pp.)
Toggle wrench, of, for pressing pins, Sept., p. 66 (.5 p.)
Tool, pointers on, Aug., p. 54 (1 p.)
Diamonds
Man-made vs. natural, Sept., p. 61 (2.61 pp.)
Dies
Hydraulic equipped, advantages of, July, p. 69 (2.45 pp.)
Lamination, plus assembly, Jan., p. 37 (5 pp.)
Progressive, designs for two, Mar., p. 57 (3 pp.)
Progressive, for brass telephone parts, Apr., p. 65 (1.66 pp.)
Punch system for, Mar., p. 65 (.66 p.)
Swaging, design of, May, p. 59 (3 pp.)
Drilling
Building-block machine for, Jan., p. 42 (1 p.)
Circuit boards, new method for, Sept., p. 58 (.5 p.)
Jig for, design of, July p. 73 (2 pp.)
Layout, tape controlled machine for, Sept., p. 70 (.66 p.)
Programming for numerically controlled, Apr., p. 58 (4.0 pp.)
Tape controlled, at Solar Aircraft, Mar., p. 55 (2 pp.)
Turret machine, with 183 spindles, May, p. 70 (1 p.)
Electrohydraulic Forming
Status of, July, p. 43 (1 p.)
Fixturing
Design of, for drilling and turning, July, p. 73 (2 pp.)
Milling machine, for tape controlled, Jan., p. 48 (2-1/2 pp.)
Gages
Hole location gage, Sept., p. 57 (1.5 pp.)
Gears
Fixture determines tooth form requirements for, July. p. 53 (3.93 pp.)
Grinding
Lapping, a clue to, of irregular surfaces, Apr., p. 57 (1.0 p.)
Machine for 60" OD-ID cylindrical and face, May, p. 48 (1 p.)
Machine, new, double-spindle disc type, with, Apr., p. 64 (0.5 p.)
Man-made vs. natural diamonds for, Sept., p. 61 (2.61 pp.)
Wheels, lubricant for, Apr., p. 66 (.33 p.)
Thin parts, of, Mar., p. 64 (1.33 pp.)
Heat Treating
Tool performance aided by, May, p. 54 (3.66 pp.)
Tool steels, of, Mar., p. 51 (4 pp.)
Tool steel troubleshooting, Sept., p. 53 (4 pp.)
Hydraulics
Power packages, filtration of, Sept., p. 59 (2 pp.)
Machine Tools
New, cutting costs by use of, Aug., p. 60 (1 p.)
New jig borer-miller, Aug., p. 52 (.55 p.)
New Warner & Swasey automatic chucker, June, p. 52 (.66 p.)
Preview of Chicago Shows I, Aug., p. 58 (8.8 pp.)
Preview of Chicago Shows II, Sept., p. 69 (17.8 pp.)
Standardizing dimensions of, June, p. 47 (1 p.)
Tape controlled layout drilling machine, Sept., p. 70 (.66 pp.)
Tape controlled vertical borer-miller-driller, Sept., p. 116 (.66 p.)
Machining
Ceramic tools, with, June, p. 48 (2.9 pp.)
Faster speeds, design linked for economy, Mar., p. 48 (3 pp.)
Hi-temp alloys, of, Feb., p. 51 (1.9 pp.)
High efficiency, calculator for determining conditions for, Sept., p. 68 (1 p.)
High speed turning, with carbides and ceramics, Aug., p. 45 (2.33 pp.)
Milling with ceramic tools, Sept., p. 64 (1 p.)
Titanium, of, May, p. 63 (3.34 pp.)
Tungsten, of, Feb., p. 56 (3 pp.)
Maintenance
Machine, scheduling, for, Feb., p. 62 (1.3 pp.)
Management
Businessman's role in political action, Mar., p. 7 (2 pp.)
Depreciation, understanding of, Feb., p. 41 (2.3 pp.)
Executive appraisal, Apr., p. 55 (2.0 pp.)
European expansion, cash in on, Mar., p. 45 (2.66 pp.)
Foreign competition vs. standard of living, Jan., p. 33 (1 p.)
Getting the breaks in engineering, Sept., p. 8 (1.9 pp.)
In-plant communication, machine monitors speed, Aug., p. 50 (2.11 pp.)
Maintenance, makes money, Apr., p. 9 (2.5 pp.)
Leasing, J & L Plan for, Feb., p. 63 (.66 p.)
Supervisory development, Mar., p. 61 (2.25 pp.)
Value Engineering, a tool, Feb., p. 39 (1 p.)
Manufacturing
Methods, in 18th century, July, p. 45 (4 pp.)
Marking
Contoured stencils speed part marking, June, p. 55 (1 p.)
Electrolytic, on a production basis, Jan., p. 56 (2 pp.)
Measurement
Surface plate flatness, using geometry of sphere, Aug., p. 41 (4 pp.)
Milling
Ceramic tools for, Sept., p. 64 (1 p.)
Tape controlled, tooling up, Jan., p. 48 (2-1/2 pp.)
Patents
Infringement, protection against, Aug., p. 83 (2 pp.)
Inventions, who owns, Jan., p. 58 (1.75 pp.)
Plating
Brush-on, versatile, Mar., p. 76 (1 p.)
Pneumatics
Circuits, fill-in approach to, Mar., p. 66 (5 pp.)
Pressworking
Die, carbide, for laminations, Feb., p. 50 (1 p.)
Laminations, of, and assembly, Jan., p. 37 (5 pp.)
Quality Control
Automatic inspection and sorting of tiny parts for, Feb., p. 47 (2 pp.)
Bonus plan for, May, p. 49 (1.7 pp.)
Caliper, for measuring undercut walls, Feb., p. 70 (.66 p.)
Heavy assembly, for, Feb., p. 66 (3 pp.)
Managing, for profits, Jan., p. 9 (2 pp.)
Portable surface inspection unit, July, p. 78 (1 p.)
Portable torque tension tester used for, June, p. 69 (.7 p.)
Systems, installation of, May, p. 43 (5 pp.)
Workmanship, May, p. 41 (1 p.)
Reaming
Close tolerance, Mar., p. 60 (1.33 pp.)
Solid carbide tools, with, Aug., p. 55 (3 pp.)
Reliability
Reliability—A new tool, May, p. 9 (1.86 pp.)
Shape Cutting
Flame cutting method speeds production, Sept., p. 118 (1 p.)
Tracer controlled machine for, July, p. 84 (1 p.)
Spinning
'Big Stuff', hot- and cold, Jan., p. 52 (2 pp.)
Sub-Zero Temperatures
Material processing with, July, p. 62 (3 pp.)
Threading
Machines, indicator for alignment of, Apr., p. 67 (1.00 pp.)
Tooling
Cut-rate, and methods, Apr., p. 51 (3.75 pp.)
Hydraulic combinations save time, Apr., p. 63 (1.5 pp.)
Use of nylon for, June, p. 53 (2 pp.)
Tool Steels
Diagnosis and cure of trouble with, Sept., p. 53 (4 pp.)
Heat treatment of, Mar., p. 51 (4 pp.)
Selection and heat treatment of, May, p. 55 (3.66 pp.)
Transfer machine
Chip removal, in, Feb., p. 43 (.66 p.)
32-station, for rifle parts, July, p. 82 (1 p.)
Turning
Automatic, with new turret lathe, Feb., p. 55 (.6 p.)
Indicator for, Feb., p. 64 (1.3 pp.)
Fully powered, with new VTL, Jan., p. 36 (1 p.)
High speed, with carbides and ceramics, Aug., p. 45 (2.33 pp.)
Large rings, fixtures for, July, p. 73 (2 pp.)
Screw machine, with, to eliminate second operations, Feb., p. 44 (2.6 pp.)
Ultrasonics
Sonic energy as a production tool, June, p. 7 (2 pp.)
Welding
Machine tool bases, of, plastic models for stress analysis in, May, p. 51 (3 pp.)
Titanium, of, May, p. 63 (3.34 pp.)
Welded construction of tapping machine, Aug., p. 47 (2.26 pp.)

NEW! PUNCH PRESS FEEDS

RAPID-AIR speeds your production
Compact . . . Fast . . . Accurate!



6 models

Rapid-Air press feeds are self-contained air operated, high speed units for feeding coil stock up to 6" wide. Easy to set up, unit mounts on die set or bolster. Write for bulletin.

MTE MECHANICAL TOOL & ENGINEERING CO.
2323 TWENTY-THIRD AVENUE, ROCKFORD, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1341

UNUSUAL BARGAINS

(Order by Stock No.—Check, M. O. or Open Account—Money-back Guarantee)
Minimum order on open account $5.00

GIANT MAGNET! TERRIFIC BARGAIN

War surplus — Alnico V-type! Horseshoe shape. Tremendous lifting power. 15¾ lb. size. Approximately 5,000-6,000 Gauss rating. Will lift over 250 lbs. Dimensions: A—5-3/16"; B—3¾"; C—5½"; D—2½"; E—2⅛"; F—4⅜".
Stock No. 85,088-EW .....$22.50 F.O.B.
Shipping weight 22 lbs.

STEREO MICROSCOPE

TERRIFIC BUY! AMERICAN MADE

Up to 3" Working Distance—Wide 3 Dimensional Field. Used in production, in research, or at home; for inspections, examinations, counting, checking, assembling. 2 sets of objectives on rotating turret. Standard pair of wide field 10X Kellner Eyepieces give you 23 power and 40 power clear, sharp, erect image. Helical rack and pinion focusing. Interpupillary distance adjustable. SO GOOD WE'LL SHIP ON TEN-DAY FREE TRIAL.
Stock No. 85,056-EW—full price $99.50 f.o.b. Barrington, N.J.

Check, Measure, Inspect with this

6 POWER POCKET COMPARATOR

(Complete with Leather Case)
MEASURES • Angles • Radii • Circles • Linear — in both decimal inches and millimeters.
Used to check layouts, machining on tools, dies, gauges; to check threads, chamfers, wear on cutting tools, etc.
Stock No. 30,061-EW. . New Low Price $19.50 Pstpd.
Send Check or M.O.—or order on open account.

HANDY! FAST! ACCURATE!

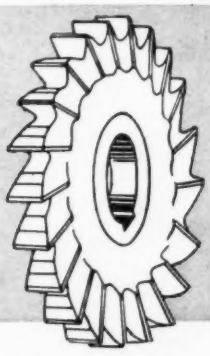
FREE! Giant CATALOG of OPTICAL BUYS!

OVER 1,000 OPTICAL ITEMS . . . Many on-the-job helps . . quality control aids! 128 pages—hundreds of illustrations. Many war surplus bargains! Imported instruments! Lenses, Prisms, Magnifiers, Telescopes, Satellite Scopes, Microscopes, Binoculars, etc. Optics for industry, research labs, experimenters, hobbyists, math learning aids. Write for FREE Catalog EW.

Send Check or Money Order, Or Order on Open Account
EDMUND SCIENTIFIC CO., Barrington, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 1351

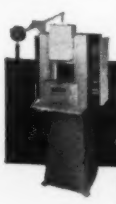
Better Tools From SENTRY Hardening



THE TRUE TEST of your machine tools is their performance on the job — how they benefit your production. This is where Sentry Furnaces with the Diamond Block method of atmosphere control demonstrate their value. Your high speed steel tools hardened in the truly neutral Sentry Diamond Block atmosphere achieve maximum hardness without scale or decarburization, maintain their sharp cutting edges longer, step up production.

Write for literature and send sample of your tools for free demonstration hardening.

505-9

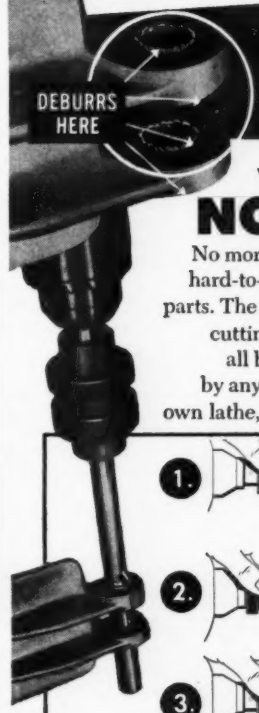


Sentry™ ELECTRIC FURNACES

Request Catalog S-9, Write THE SENTRY CO., FOXBORO, MASS.

CIRCLE INFORM-A-GRAM KEY NO. 1352

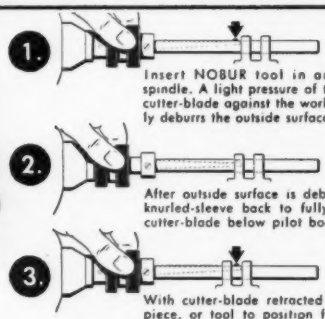
How to... DEBURR THESE INACCESSIBLE HOLE FACES BY MACHINE OPERATION



★ faster
★ better
★ easier

with the amazing NOBUR TOOL

No more hand-finishing methods for those hard-to-get-at inner surfaces on multi-wall parts. The NOBUR Tool with its double edge cutting blade does the job in seconds . . . all by *machine operation.* Can be used by anyone, with complete safety, on your own lathe, drill press, etc. Simple to operate.



1. Insert NOBUR tool in any machine spindle. A light pressure of the revolving cutter-blade against the workpiece quickly deburrs the outside surface.

2. After outside surface is deburred, slide, knurled-sleeve back to fully retract the cutter-blade below pilot body diameter.

3. With cutter-blade retracted move workpiece, or tool to position for deburring inside surface. Raise (project) cutter-blade and advance tool or work piece to deburr first one surface then the other.

NOBURSINK...

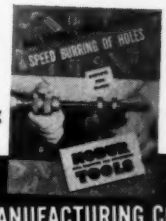
a new approach to chatterless DEBURRING and CHAMFERING

Now . . . deburr openly accessible hole faces faster and easier than ever before. Low torque design permits rapid, offhand workpiece handling without chatter — even on large diameters. May be reground without special tools. Works on all metals, plastics, etc. Each tool accommodates a wide range of work sizes.

FOR FULL DETAILS

Write for FREE Folder

Send for all the details on Nobur Tool Products — the key to *lower* costs, *higher* production and *improved* quality on your deburring operations. WRITE TODAY!



NO/BUR TOOLS **NOBUR** MANUFACTURING CO.
6860 Farmdale Ave. No. Hollywood, California

CIRCLE INFORM-A-GRAM KEY NO. 1353

ADVERTISERS' INDEX

Acme Tool Corporation 126
Aget Manufacturing Co. 111
Air-Mite Devices, Inc. 131
Alina Corporation 90
Allegheny Ludlum Steel Corp. 71
Alva Allen Industries 121
Allied Products Corp. 17
Almco, Queen Products Div., King-Seeley Corp. 124
Alpha-Molykote Corp. 111
American Drill Bushing Co. 138
American Standard Punch Corp. 109
Anaconda American Brass Co. 31
Anchor Chemical Co. 133
Armstrong-Blum Mfg. Co. 132
Armstrong Brothers Tool Co. 105
Atlas Press Company, Clausing Division 69

Bausch & Lomb Optical Co. 6, 27
Bellows-Valvair Div., IBEC 24
Benco Collet Mfg. Co. 7
E. W. Bliss Company 93, 133
Bokum Tool Co. 112
Branch Manufacturing Co. 119
Brush Instruments Div., Clevite Corp. 137
Buck Tool Company 94
H. L. Bushman Co., Inc. 130

Chicago Tool & Engrg. Co. 123
Clausing Division Atlas Press Company 69
Clearing Div., U.S. Industries, Inc. 21
Cleveland Crane & Engrg. Co. 85
Cleveland Punch & Shear Wks. Co. 15
Commander Manufacturing Co. 109
Comtor Company 121
Contract Services Directory 99
Cooke, Troughton & Simms, Inc. 127
Cook's Lead Hammer Service 107
Cooper Weymouth, Inc. 123
Crucible Steel Co. of America 14

Danly Machine Specialties, Inc. 82
Dayton Perforators, Inc. 103, 104
Dayton Rogers Mfg. Co. 107
J. Arthur Deakin, Inc. 127
Dearborn Gage Co. 107, 113
Defiance Machine & Tool Co. 112
Detroit Power Screwdriver Co. 40
Detroit Testing Machine Co. 120
Dexco Corp., Raymac Div. 131
The DoAll Company 95
Dremel Mfg. Co. 99
Durant Tool Supply Co. 118
Dykem Company 130

Eclipse Counterbore Co. 99
Economy Engineering Co. 114
Edlund Machinery Corp. 26
Edmund Scientific Co. 135
Eisler Engineering Co. 99
Eldorado Tool & Mfg. Co. 123
Elliott Service Company 128
Engelhard-Hanovia, Inc. 115
Erickson Tool Company 48

Federal Press Co. 74
Fellows Gear Shaper Co. 28
Fenn Mfg. Co. 46
Field Tool Supply Co. 125
Fortune Industries Inc. 107

Gas Appliance Service, Inc. 112
General Tool Div., General Fire Extinguisher Corp. 105
Gisholt Machine Co. 35
Graham Mfg. Co. 126
Greenlee Bros. & Co. 70

Hamilton Tool Company 8, 9
Hannifin Cylinder Div., Parker-Hannifin Corp. 41
Harco Engineering 112
Hardinge Brothers, Inc. 32, 89
Hard-N-Tuff Corp. 120
Harig Manufacturing Corp. 12
Heimann Mfg. Co. 107
Heuser Mfg. Co. 107
High Speed Hammer Co. 112
Huebner Publications, Inc. 86, 105, 116, 129
Huron Machine Prods., Inc. 127
Wm. T. Hutchinson Co. 33
Hydraulic Press Mfg. Co. 43

Induction Heating Corp. 87
Industrial Tectonics, Inc. 114

Jacobs Mfg. Co. 23
Jergens Tool Specialty Co. 114
Johnson Gas Appliance Co. 90
Johnson Mfg. Corp. 10

Kenco Sales Company 102
Kidde Precision Tool Corp. 116

Lassy Tool Co. 111
Lennox Tool & Machine Bldrs. 125
Lepel High Frequency Labs. 128
Louis Levin & Son, Inc. 124
F. J. Littell Machine Co. 79
Lovejoy Flexible Coupling Co. 116

Machinery Builders, Inc. 16, 88
Mahr Gage Co. 124
Mechanical Tool & Engrg. Co. 134
Meier Brass & Aluminum Co. 119
Metallurgical Prods. Div., GE 96
W. F. Meyers Co., Inc. 119
Micrometrical Mfg. Co. 22
The Minster Machine Co. 39
Montgomery & Co., Inc. 122
Moore Special Tool Co. 47
Morrison Machy. & Engrg. Corp. 111

Karl A. Neise 132
Niagara Cutter Div., Bollier-Damerell, Inc. 133
Nobur Manufacturing Co. 135

O'Neil-Irwin Mfg. Co. 98, 117
Opto-Metric Tools, Inc. 129
Ortman-Miller Machine Co. 75

Parker-Hannifin Corp. Hannifin Cylinder Div. 41
Perkins Machine Co. 30
Prebco Bushing Co. 113
Precise Products Corp. 121
Producto Machine Co. 90
Punch Products Corp. 42

Raymond Manufacturing Div., Assoc. Spring Corp. 114
Reid Tool Supply Co. 87
Ren Plastics, Inc. 45
J. A. Richards Co. 116, 129
Ring Punch & Die Div., Producto Machine Co. 101
Rockwin Mfg. Co. 133

S-P Manufacturing Corp. 122
Sales Service Mfg. Co. 113, 130
Scully-Jones & Co. 125
The Sealube Company 84
Searjeant Metal Prods., Inc. 128
Seibert & Sons, Inc. 87
The Sentry Company 135
Service Machine Co. 130
Severance Tool Industries 127
Sheldon Machine Co. 118
Shore Instrument & Mfg. Co. 113

Skinner Chuck Co. 19, 20
Special Engineering Service, Inc. 109
R. L. Spellman Co. 111
Standard Tool & Mfg. Co. 78
P. A. Sturtevant Co. 126
Superior Steel Products Corp. 50
Supreme Products Corp. 3
Syntron Company 91

C. B. Teeter 130
Timken Roller Bearing Co. 11
Titan Tool Supply Co. 116
Tomco, Inc. 115
Trico Fuse Mfg. Co. 90

United States Diamond Wheel Co. 4
U.S. Metallurgical Labs. 116
U.S. Tool Company, Inc. 18
Universal Engineering Co. 13, 34

Vascoloy-Ramet Corp. 5
Vernon Devices, Inc. 107
Verson Allsteel Press Co. 100
Vlier Engineering Corp. 44

The Walton Company 121
Ward Machinery Co. 119
Warner & Swasey Company 2
Watts Brothers Tool Co. 113
Webber Gage Co. 92
Wesson Company 37, 38
S. B. Whistler & Sons, Inc. 131
K. R. Wilson, Inc. 36
Wisconsin Drill Head Co. 97
Woodson Tool Company 102

The Yoder Company 102

Zagar, Inc. 129

ADVERTISING REPRESENTATIVES

CHICAGO 1:
Robert R. Pierson
333 N. Michigan Ave.
FRanklin 2-4811

CLEVELAND 18:
Jerry J. Miller
1975 Lee Road
FAirmount 1-4040

DETROIT 2:
R. F. Pickrell & R. M. Prymuski
318 Stephenson Bldg.
TRinity 1-0790

NEW YORK 17:
Jack Bain Co.
545 Fifth Ave.
MUrray Hill 2-3345

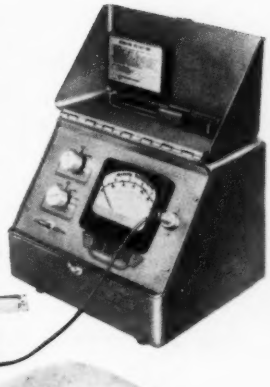
NEW ENGLAND:
E. P. Meade, Jr.
454 Statler Office Building
Boston 16, Mass.
LIberty 2-9677

WEST COAST:
Pugh & Rider Associates
Los Angeles 17, California
M. D. Pugh & J. M. Rider
1709 West 8th St., Room 404
HUbbard 3-0537

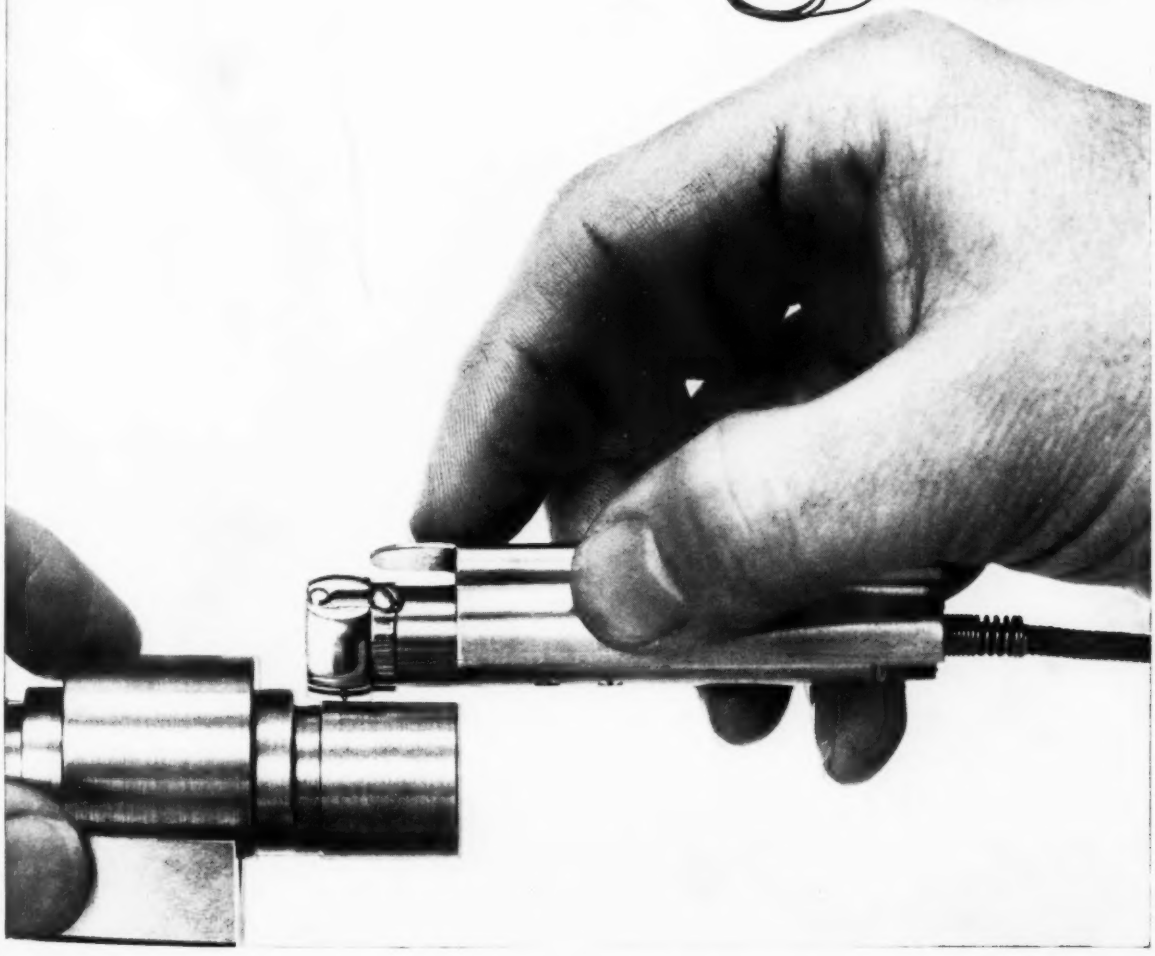
Palo Alto, California
Hunter Vinton
16 Crescent Drive
DAvenport 5-4815

GET TRUE READINGS ON FINISHES EVERYTIME, EVERYWHERE WITH SURFINDICATOR

Job to job, plant to plant, *every* Brush Surfindicator gives true and identical readings from 0 to 1000 microinches on the same surface. Precision reference standard comes with every unit; makes field calibration simple and eliminates need for factory adjustment. The Surfindicator is immune to magnetic fields, vibration, line voltage variations; weighs but 15 pounds and is completely self-contained. **The Brush Surfindicator Complies Completely With ASA and MIL Specs. See For Yourself. Request A Demonstration.**



brush INSTRUMENTS
DIVISION OF
37TH AND PERKINS CLEVITE CORPORATION CLEVELAND 14, OHIO



CIRCLE INFORM-A-GRAM KEY NO. 137

VOTE AMERICAN...

To vote is to express preference—to register the will of the individual in the course of the nation and world. The true voice of the majority is heard and felt only as each person exercises his God-given right and responsibility to vote. Let's be there when the polls open!

Vote for whom you please. TO VOTE IS AMERICAN!

American DRILL BUSHING CO.

5107 Pacific Blvd., Los Angeles 58, California

"WORLD'S LARGEST INVENTORY OF PRECISION DRILL JIG BUSHINGS"
TELEPHONE LUdlow 3-6551 **TELETYPE LA 1315**

CIRCLE INFORM-A-GRAM KEY NO. 138